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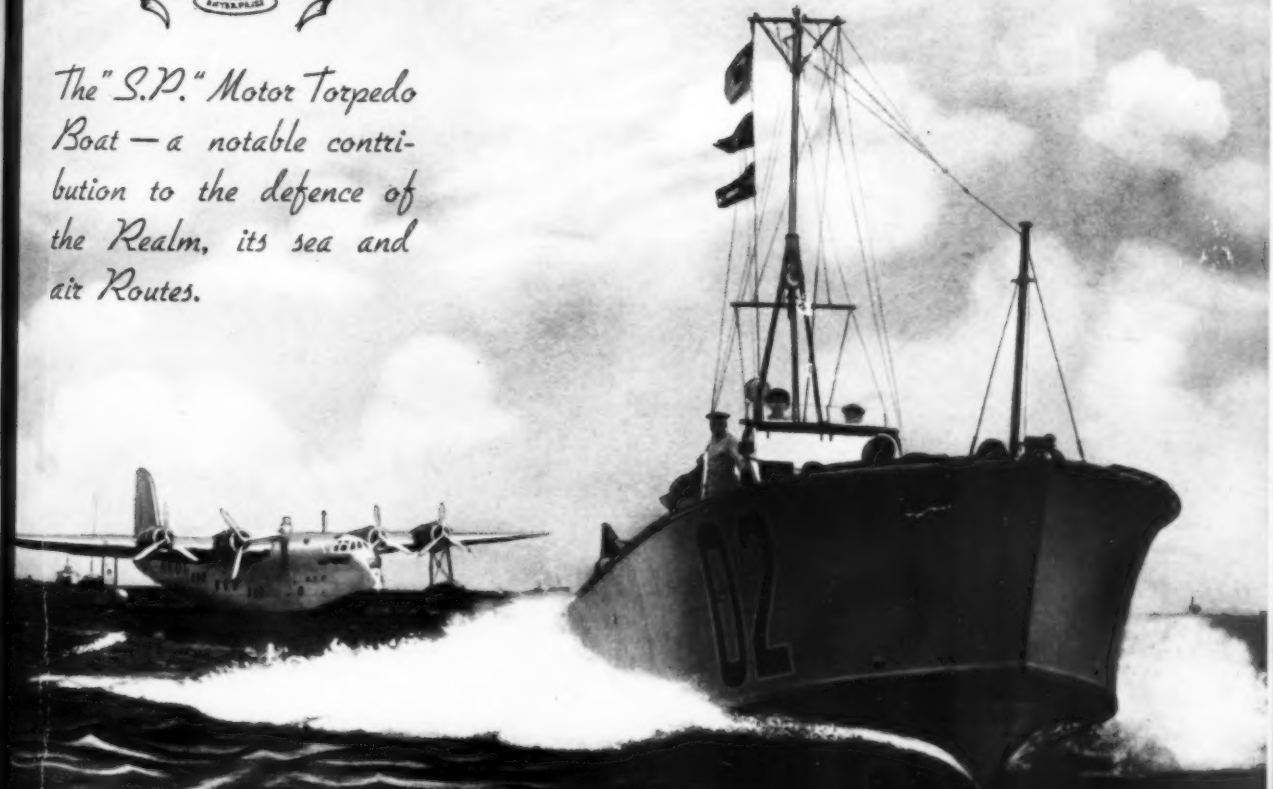

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FLIGHT

The AIRCRAFT ENGINEER AND AIRSHIPS

FIRST AERONAUTICAL WEEKLY IN THE WORLD : FOUNDED 1909

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The Outlook

Commercial Acceptance Tests?

ONE of the declared objects of the British Air Line Pilots' Association is to ensure that pilots will have some say in the choice and equipment of the machines which they are expected to fly. In some quarters the suggestion has been taken a step further, to the extent of advocating the establishment of a kind of acceptance committee of pilots.

The idea is not new, and has been operated domestically by at least one Continental company for a number of years. The flying superintendent makes no pretence of having up-to-the-minute practical knowledge, but refers all equipment proposals to his committee of half a dozen senior pilots, among whom are experts in radio and other specialist departments.

Though adoption of such a scheme on a non-domestic basis would present obvious difficulties, the need for more ambitious "commercial acceptance tests" is very real. The average works test pilot does not and cannot see and feel a new commercial aeroplane through the eyes and hands of the man who will ultimately fly it, day in and day out, in every kind of weather. Examples come easily to mind, such as that of the otherwise excellent aeroplane which utterly wearied pilots by its lack of stability when being flown with full load.

Although high altitude ratings of modern specifications are already compelling test pilots (most of whom frankly confess to a fair-weather complex) to fly under conditions which tend to bring such shortcomings to light, it is one thing for a man to fly a machine with full load in picked conditions, or in cloud with the knowledge that he can "break the ice" at will, and quite another to fly of necessity for several hours on the instruments, knowing that he must "hang on" until the terminal airport has been reached.

Welcome Visitors

THIS week is something of a landmark in the history of the R.A.F. in that some distinguished officers of the German Air Force are visiting this country as the official guests of the British Air Council. General Erhard Milch, Secretary of State for Air in Germany, heads the German party, which also includes Major-General Ernst Udet, the famous German wartime pilot (known to devotees of the better form of cinema by his brilliant flying in the film *White Hell of Pitz Palu*), and Lt.-Gen. Stumpff.

When a party of Royal Air Force officers, under the leadership of Air Vice-Marshal Courtney, made a tour of German Air Force centres last January they were shown a great deal of the working and equipment of the German Air Force, and the hospitality shown them is now being reciprocated.

That our distinguished German visitors have been able to form a fairly complete picture of the Royal Air Force under the Expansion seems to be indicated by the fact that they have visited or are about to visit one fighter station (Hornchurch), one bomber station (Mildenhall), the R.A.F. College at Cranwell, where is also situated the Electrical and Wireless School, the School of Technical Training of Apprentices at Halton, and the Station Headquarters at Odiham, where are stationed two Army Co-operation Squadrons (Nos. 4 and 13). Although the list is not extensive it is very representative of the R.A.F. as it exists to-day, and it has been supplemented by visits to various aero engine and aircraft factories, not to mention a look-in at a shadow factory.

There are bound to be those who think we are showing our German visitors too much. The answer to that seems to be that they showed our representatives as much in January. Moreover, one might borrow a phrase used by Mr. J. D. North some years ago about designers contributing articles to *Flight* and say that if ten nations send representatives to one another's factories each stands to gain nine times as much as it gives in the way of information.

Closer Co-operation

LAST week must have seen a marked tautening of inter-Service bonds. First came the news that five cabin Autogiros with direct-start characteristics had been ordered by the Air Ministry for the transport of Army Staff officers to and from headquarters. The good feeling which this must have occasioned in certain messes was heightened by reports of some really useful "A.C." work in the desolate Sudd swamps where, at the moment of writing, Brigadier General Lewin and his wife are bidding farewell to their King's-Cup-runner-up Miles Whitney Straight.

The "jumping 'Giros" concerned are two-seaters powered with the Siddeley Civet (Genet Major to civilians).

They should be popular, as compared with the Rotas (C.30s to civilians) issued some while back, not only because of their increased usefulness, due to their vertical initial climb, but thanks to their cabins, which will preclude pre-flight strivings with Sam Brownes, Sidcots and attendant "clobber."

Even more comforting than the knowledge that there is a movement toward increased comfort in Staff vehicles is the vindication, in the eyes of the public, of the characteristic A.C. "fishing hook" at which they have oft-times smiled at Hendon. It was much too amusing to be useful, they thought. But they may have changed their minds when they read in their papers that, through this hook, the Lewins had been able to convey to a machine of the R.A.F. "search party" the information that they were temporarily safe, but sorry at the inconvenience they had caused and apprehensive lest any of their would-be rescuers had come to any harm.

R.A.F. Regiments

A WRITER in the *Royal Air Force Quarterly* raises the interesting, though not novel, suggestion that the R.A.F. should adopt a regimental system such as prevails in the Army. He argues, truly enough, that *esprit de corps* is stimulated by houses in a school and by regiments in the Army, but that squadrons in the R.A.F. do not make the same appeal because the personnel is changed so frequently and rapidly. He proceeds to outline a scheme for establishing regiments in the R.A.F., each regiment to contain so many squadrons, some of which would be bombers, some fighters, and some of another class.

It is certainly true that this writer, Flt. Lt. F. J. St. G. Braithwaite, has put his finger on a spot in R.A.F. organisation where improvement is possible, but it is doubtful whether he has hit upon the best way of rectifying it. The Army certainly gains a good deal by the devotion of all ranks to their regiment, but, on the other hand, the Navy gets on excellently well without such a system. During each commission the ship arouses *esprit de corps*, but that sentiment can only last for the duration of the commission. The true love of the sailor is for "The Service." That should also be the cult of the airman.

It may be asked why the devotion of the airman to his squadron should be less than that of the sailor to his ship. The answer is that transfers of all ranks from squadron to squadron are much too frequent, and that the personnel of most squadrons is in a constant state of flux. Before the expansion scheme began a Short Service officer spent one year at a Flying Training School and five with squadrons. Now, the S.S. officer only spends four years in all in the Service before going on to the Reserve. It would surely not be unreasonable to expect that he should normally spend all of that short time with one squadron. Specialisation of that sort is not in favour with the Air Ministry. The authorities want every pilot to have experience of at least two different classes of R.A.F. work, say bombing and army co-operation. The idea has been explained as providing a reserve of pilots for every class of work.

Why Not Specialise?

THERE is, however, a school of thought in the R.A.F. which holds that this idea of making every pilot a jack of several trades is overdone, and that it would be better all round to find round holes for round pegs, put the one lot into the other, and keep them there. Then one would get specialisation of a very high order, and what is more, squadrons would become very much what regiments are in the Army. Even as things are, we believe that most men do learn an affection for each squadron to which they are posted, but there is certainly too much of being off with the old love and on with the new to obtain the best results of *esprit de corps*. It would be some gain if transfers, when unavoidable, were made as far as possible within whatever Group each pilot happened to be. The Group would then correspond to the Royal Regiment of Artillery and the squadrons to the batteries.

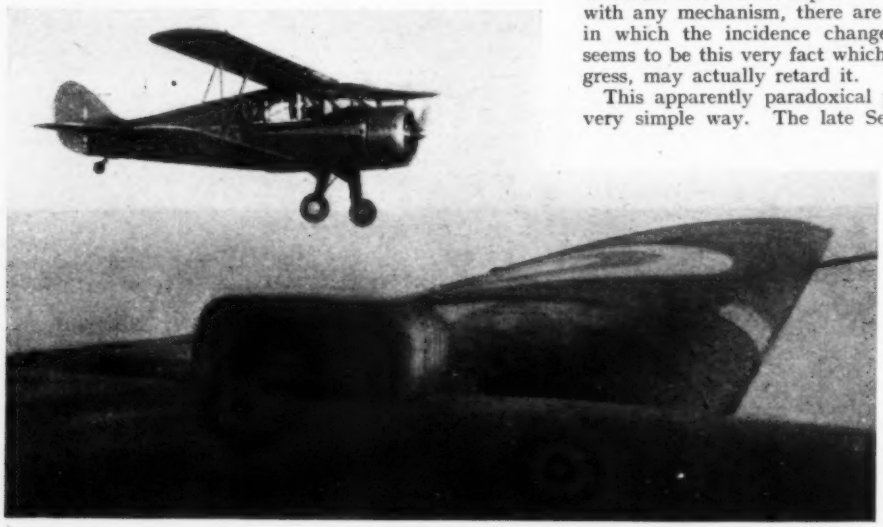
After all is said and done, it is possible to have too much *esprit de corps*, just as it is possible to have too little of it. That the idea is sometimes carried too far in the Army is shown by such mythological stories as "The Tenth don't dance." The healthiest devotion is to a man's own Service, though the secondary loyalty to regiment, ship, or squadron, is certainly useful in helping to promote the subordination of self to that of the unit. The R.A.F. might well go much farther than it has in linking the man to the squadron.

Rotating Wings

"GREAT stuff, sir," was the way in which Lt.-Col. Moore-Brabazon expressed his opinion of Herr Hafner's reference to fixed wings and fixed ideas, door-to-door flying, and the avoidance of thinking and flying in circles, quoted in *Flight* last week. Herr Hafner's paper, a summary of which is published in this issue, disclosed many principles fundamental in all rotating-wing aircraft, and is to be welcomed on that score no less than because of the proof it gave that this particular designer has made great headway towards a practical gyroplane.

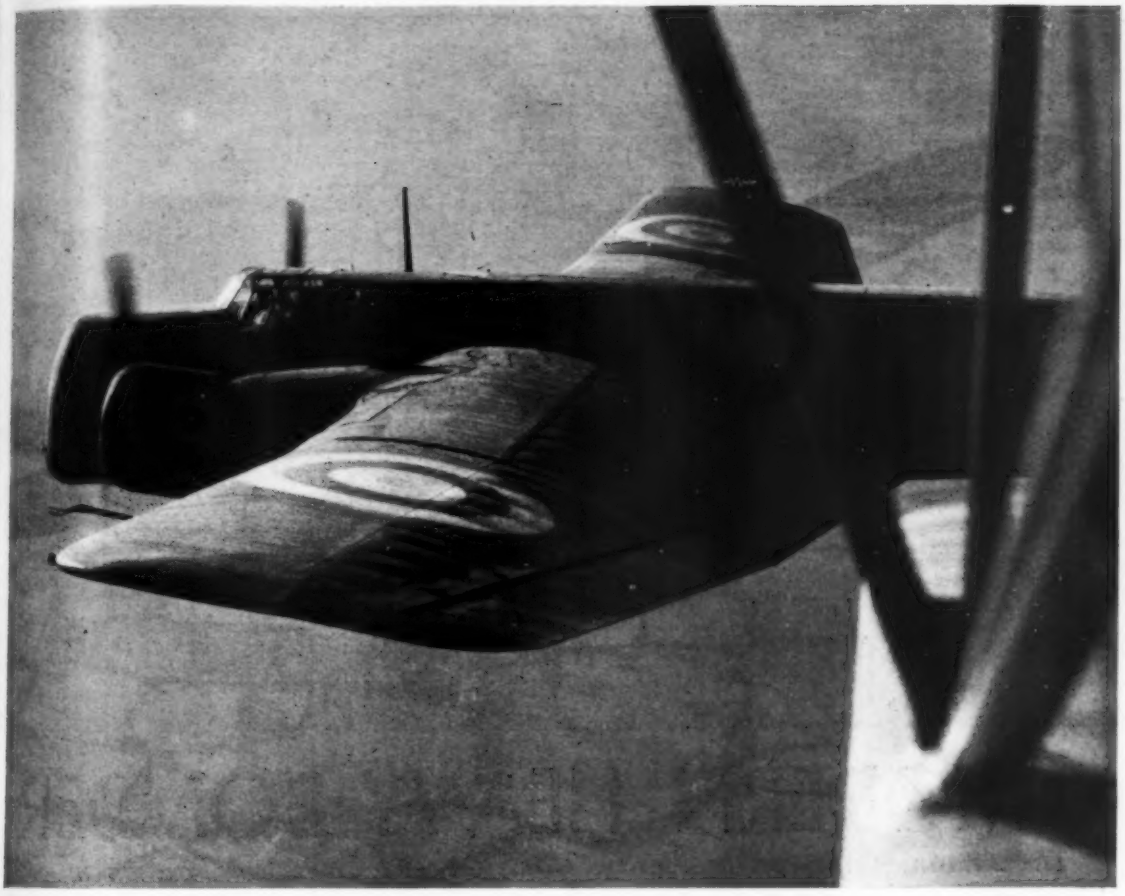
From Herr Hafner's paper itself and from personal knowledge of what is being done by others, one can begin to form an opinion of the paths which progress is likely to follow. It seems to be a fundamental fact that the ability to select the incidence of the rotor blades confers on a rotor a greater aerodynamic efficiency than can be obtained when the sole control depends on tilting the rotor head. As with any mechanism, there are obviously numerous ways in which the incidence change can be effected, and it seems to be this very fact which, instead of hastening progress, may actually retard it.

This apparently paradoxical position comes about in a very simple way. The late Señor de la Cierva was for



TAKER—AND TAKEN: This snapshot was taken from an Armstrong Whitworth Whitley. In the Avro Commodore, flown by Flt. Lt. Reynell, is *Flight's* chief photographer, and they are just manœuvring into position to secure the striking close-up picture reproduced on the opposite page.

DIARY OF FORTHCOMING EVENTS—P. 402.



AT CLOSE RANGE: An Armstrong Whitworth Whitley heavy bomber—described in detail on pages 396-402—photographed from a machine flying close alongside. The pilot of the Whitley was F/O. E. S. Greenwood, the assistant A.W. test pilot.
(*Flight* photograph.)

many years the only serious worker in this particular field. His successes inspired others to study the subject, and not a few invented and patented details of rotor-head mechanisms; several have been described and illustrated in *Flight* from time to time.

The Cierva Company, also, has taken out numerous patents, and as holders of the original patents with many years of experience they naturally have certain claims which cannot be set aside either on legal or moral grounds. On the other hand, "two heads are better than one," and some of the later comers have undoubtedly had good ideas. If we lived in an altruistic world the matter would be simple. As it is, it is to be hoped for the sake of progress that the various interested parties will find a way of getting together. The ultimate success of rotating-wing aircraft is no longer in doubt. A concentration of effort would hasten the day of its arrival.

Memorial

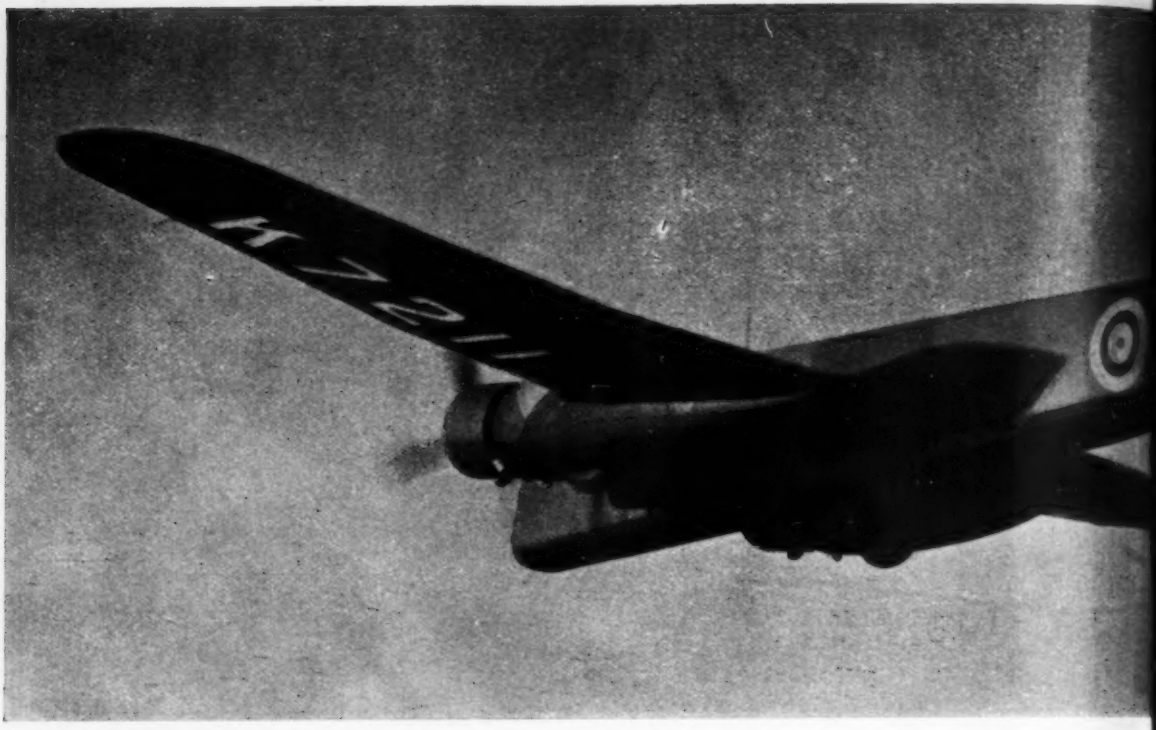
RARELY, if ever before, in the history of flying has an aircraft type become extremely popular and then damned because some hidden and inexplicable defect caused structural failure in a few instances. Yet that was the fate of the De Havilland Puss Moth. Pilots all liked the machine, private owners bought it in large numbers, several pilots used it in a heavily loaded condition for long-distance record flights and no one found anything to criticise, but a great deal to praise. Then reports of structural failures began to come in, and in the period October, 1930-June, 1933, nine cases of structural failure occurred. After each accident everyone concerned did his utmost to trace the cause, modifications were made, but still the accidents occurred. With one exception they happened abroad, and with one exception there were no survivors who could have thrown light on the sequence of events. One similarity was found to have marked all the accidents: they took place during flights in stormy and bumpy weather.

The Puss Moth is now a type of the past, and the reputation of the De Havilland Company was such that it survived the blows which each of these accidents represented; subsequent history has had no recurrence of the sort to show, although the company has produced several types since the Puss Moth, all highly successful and none exhibiting any signs of tendency to structural failure.

The Accidents Investigation Sub-Committee on Puss Moth Accidents published its report (R. & M. No. 1645) some time ago. That report is reproduced in full, with appendices containing all the evidence, in R. & M. 1699, issued last week.

As a tombstone to the Puss Moth this belated publication probably has its uses, although the conclusions of the sub-committee are not very helpful to those who would apply Puss Moth lesson to other monoplanes. The sub-committee holds the view that the accidents were due to flutter, "probably of the wings, but possibly in some cases of the rudder." The recommendation is made that "routine calculations or experiments on flexibility should be made for each design."

Which only goes to show that even Air Ministry experts are fallible, for the Puss Moth complied with all the Air Ministry strength regulations of the period and no case of defective workmanship or material was brought to light.



A MODERN HEAVY BOMBER

The Armstrong Whitworth Whitley: Structure and Equipment Features in Detail: 200 m.p.h. with Disposable Load of 7,385lb.

Illustrated with "Flight" Photographs

OF the two types of heavy bomber in large-scale production for the R.A.F., the Armstrong Whitworth Whitley was the first to take the air, having been developed in several respects from the A.W.23 bomber transport, which may be classed among the more outstanding weight-lifting machines produced in recent years. A fuselage of smaller cross-section and the introduction of more advanced engine types has given the Whitley a greatly improved performance as compared with the "23," and could some formula be devised to assess the actual value of a machine as a military weapon, taking into consideration performance, disposable load, flying qualities and the efficiency of the armament layout, the Whitley would undoubtedly make a very good showing against comparable types going into service abroad.

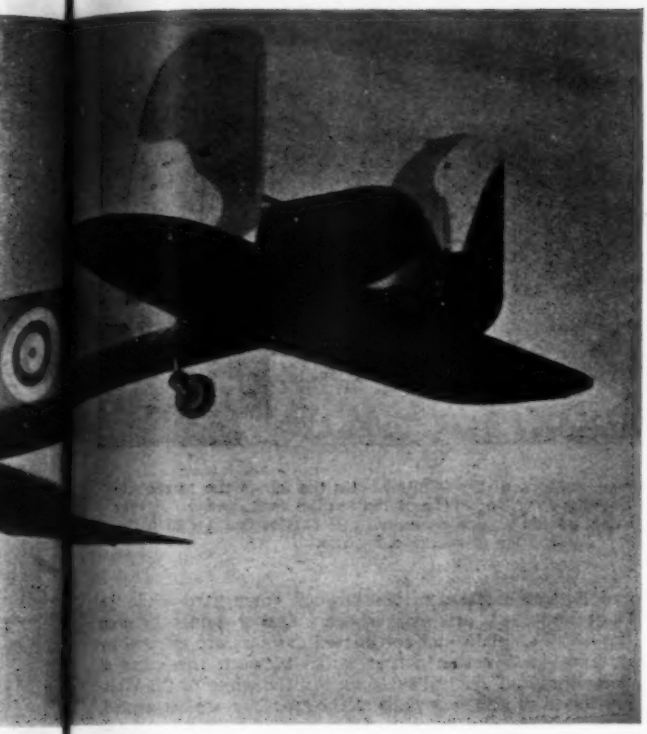
In the cockpit of the Whitley. There is ample room for the two pilots, and the view in all essential directions is unrestricted. At the controls when this picture was taken was F/O. E. S. Greenwood.

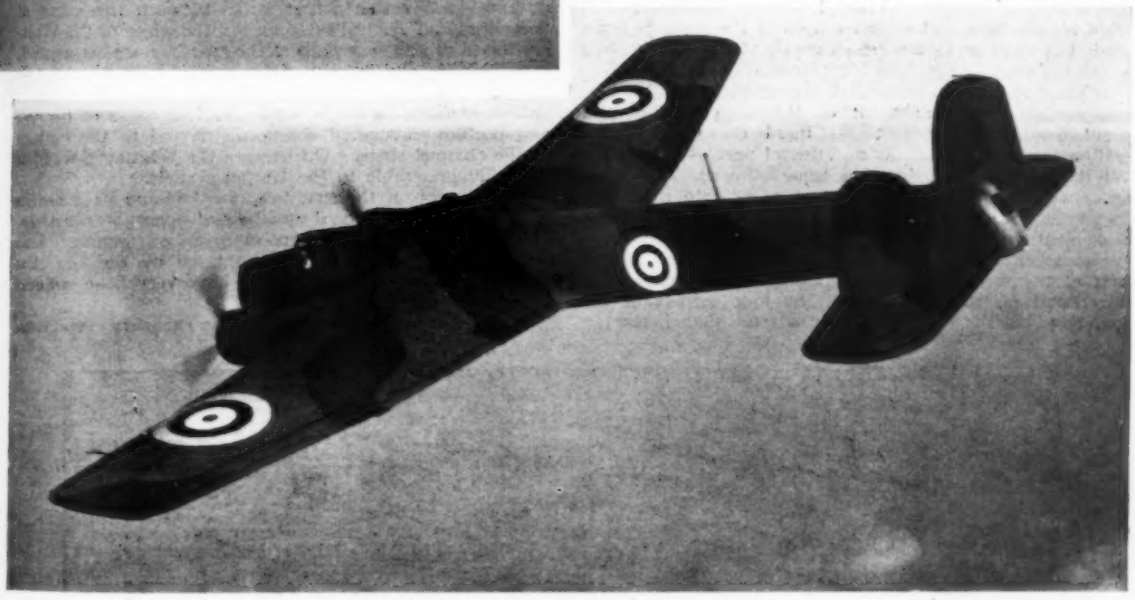
The original series of Whitleys, designated Whitley I, was fitted with two medium-supercharged Siddeley Tiger IX fourteen-cylinder two-row radials giving a maximum power of 805 h.p. at 7,200ft., and mounted Armstrong Whitworth manually operated gun turrets. The second series (Whitley II) has a later type of Tiger—the Mk. VIII with two-speed supercharger. This unit is rated at 845 h.p. at 6,250ft. (low gear) and 760 h.p. at 12,750 (high gear), the maximum output being 780 h.p. at 14,250ft. The Whitley II, incidentally, is the first Service type to receive this engine and, so far as is known, the first military aeroplane to take advantage of the benefits conferred by the two-speed blower.

Differences

Both the Whitley II and Whitley III have these engines, but the latter incorporates Nash and Thompson power-operated gun turrets. It may be recalled that the demonstration Whitley at the last S.B.A.C. display had temporary fairings, pending the fitting of the turrets. Certain other detail improvements, including the adoption of a new type of bomb rack, are being made in the later types of Whitley.

As supplied to the R.A.F., the Whitley is intended for long-range bombing operations by day and night, and production machines are camouflaged accordingly. Precisely what proportion of the disposable load is made up by the bombs may not be divulged, but anyone who has seen the capacious bomb cells will realise that the Whitley's





hitting power is something to be respected, particularly when it is remembered that ranges between 1,250 and 1,600 miles are obtainable.

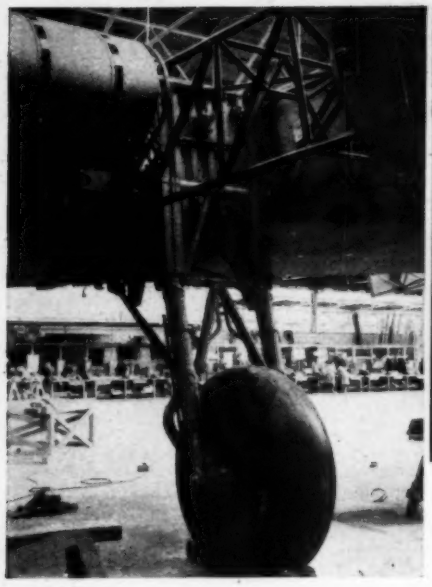
Of striking enough design, in all conscience, the Whitley is further characterised by its peculiar nose-down flying attitude, which results from the heavy incidence of the wing in relation to the fuselage. This may be considered as a legacy of pre-flap days, when such an arrangement gave the necessary ground angle to reduce the float which would otherwise afflict such a clean machine as the Whitley, and would help to shorten the landing run. Now, with its efficient trailing-edge flaps, the Whitley has fine take-off, climb and landing characteristics.

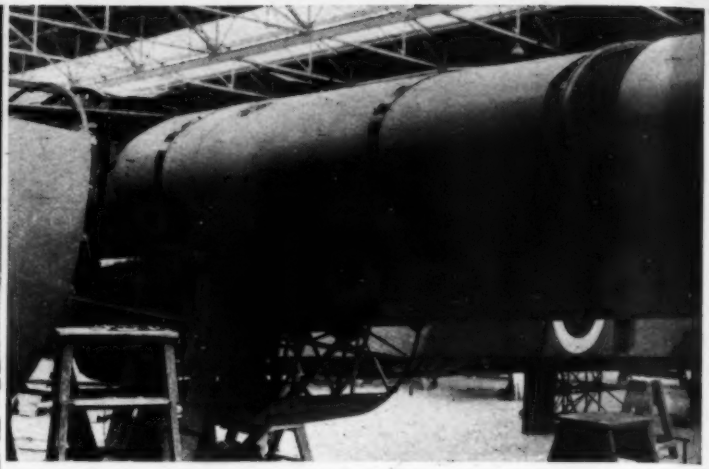
Although the two types differ greatly in their general layout, there is considerable structural resemblance between the Armstrong-Whitworth Whitley and the same firm's commercial type, the Ensign, now nearing completion at the Hamble works. The Ensign was described and illustrated in *Flight* of April 1, 1937, but it may be recalled here that the similarity in structure is confined mainly to the wing, the two fuselages being fundamentally different, although both are of the stressed-skin type.

In the construction of a landplane fuselage, as in that of a flying-boat hull, the designer may choose one of two general systems: He may run his fore-and-aft members or stringers through without interruption, joggling them into the frames; or he may leave the frames uncut and interrupt the stringers at the frames, attaching the two together by angle plates and gussets. One or other of these alternatives is the usual system. The former figures in the A.W. Ensign, but in the Whitley Mr. Lloyd, the firm's chief designer, has adopted quite a different system. In order to keep down the number of rivets needed only the main frames touch (and are attached to) the skin. The intermediate frames, which may be described as being of Omega section, do not touch the skin at all but are riveted to the stringers, which are of somewhat similar section, except that the top of the Omega is flattened in order to give a larger bearing area. How simple this type of construction is will be realised when it is pointed out that but two rivets are used at the intersection of a stringer and a frame. These two rivets secure the flanges of the frame to the flat top of the Omega, and are, of course, riveted up before the skin is put on.

Built in two main sections, the fuselage of the Whitley is of semi-monocoque construction in that of the four longerons familiar from the girder type of fuselage the lower two have been retained. In addition to stiffening the whole structure, they also serve as useful bearers of concentrated loads, aided by diagonal members in the plane of the skin. Longerons as well as main and diagonal frames are of built-up box section, two of the webs having exposed edges to facilitate the final closing of the box section by being riveted to the angle strips which form the corners of the box, as shown in the sketches.

The longerons are tapered towards the aft end, and "peter out" altogether about two-thirds of the way towards the rear end of the middle fuselage portion. From this point back to the stern, the construction is fully monocoque. In the first bay of the rear portion of the fuselage, top longerons are added to distribute concentrated loads from the wing. Further stiffening in this neighbourhood is provided by a very substantial floor, which has its corrugations (of the same type and material as that used in the construction of the wing spar box) running across the fuselage. With upper and lower longerons plus diagonal bracing members, this floor completes the





Some constructional features of the Whitley. On the left is the retractable undercarriage. Note the mounting of the oil tank in the leading edge. Above: the leading edge next to the engine mounting; it carries the petrol tanks, shaped to fit the curvature.

structure so that the cut-out for bombs does not cause any weakening.

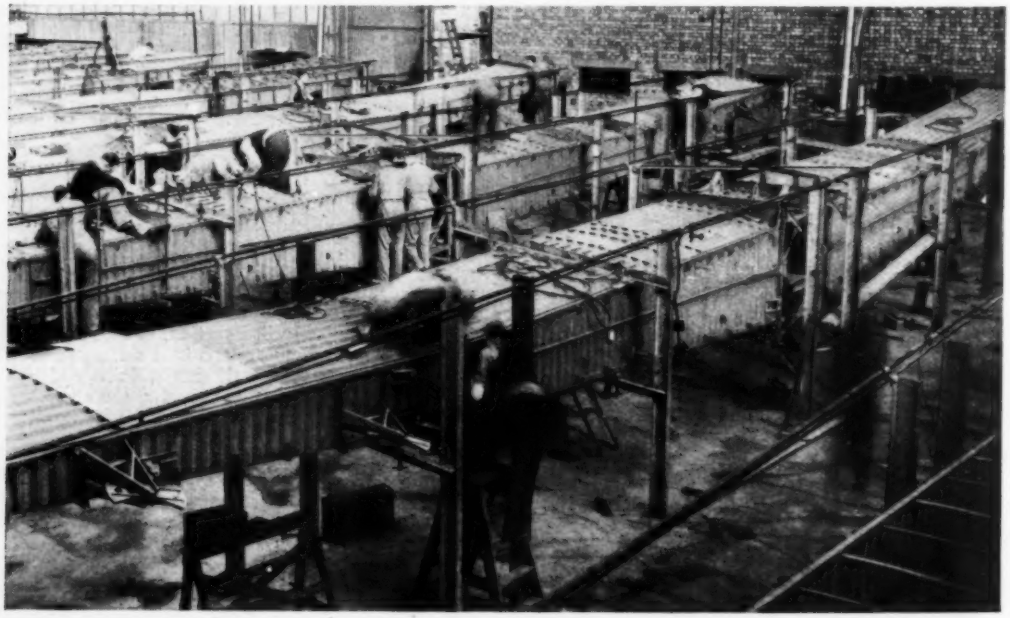
Plating of the fuselage is in Alclad, applied in quite large sheets and, as already mentioned, riveted to stringers and main frames only. The cross-section of the fuselage is an oval, but the curvatures are so gentle that panel beating is not required except in a few places near the ends.

With metal monocoque and semi-monocoque fuselage construction the attachment of the wing is always a problem. Many manufacturers build the wing centre-section into the fuselage as an integral part of it. In the Whitley a different policy has been followed. The wing spar, which is a metal "box," is a separate unit, and attachment to the fuselage is carried out at the four corners of the box.

Fundamentally, the wing construction is the same as that of the A.W. Ensign, but a simplification has been introduced in the formation of the four corners of the spar box. In the Ensign, it may be remembered, the top and bottom surfaces of the box are corrugated while the front and back are plain sheet. Corner joints between the edges of plain and corrugated surfaces are effected by interposing Z-section corner strips between the edges of horizontal and vertical surfaces. In the wings of the Whitley the front and rear walls of the spar box are corrugated, and their top and bottom edges are covered with channel-section strips, alternate corrugations being riveted to the flanges of these channels, while the free edges of the top and bottom corrugated sheets are riveted to the bottom of the channel strips. On balance the Whitley method is probably preferable to the Ensign system.

Deformation of the spar box in a fore-and-aft direction is prevented by diagonal members of open polygonal section and secondary members of open-box section. This arrangement is, of course, necessitated by the fact that the box corners of the wing spar have very little stiffness against angular distortion.

While the spar box forms the primary structural



Production: A corner of the wing shop at Baginton, showing spar boxes being assembled in their jigs.

THE ARMSTRONG WHITWORTH WHITLEY.

Two Siddeley Tiger IXs—803 (max.) h.p. each at 7,200 ft.

DIMENSIONS

Wing span	...	84 ft. (25.6 m.)
Length o.a.	...	69 ft. 3 in (21.2 m.)
Mean chord	...	14 ft. 4 in. (4.37 m.)

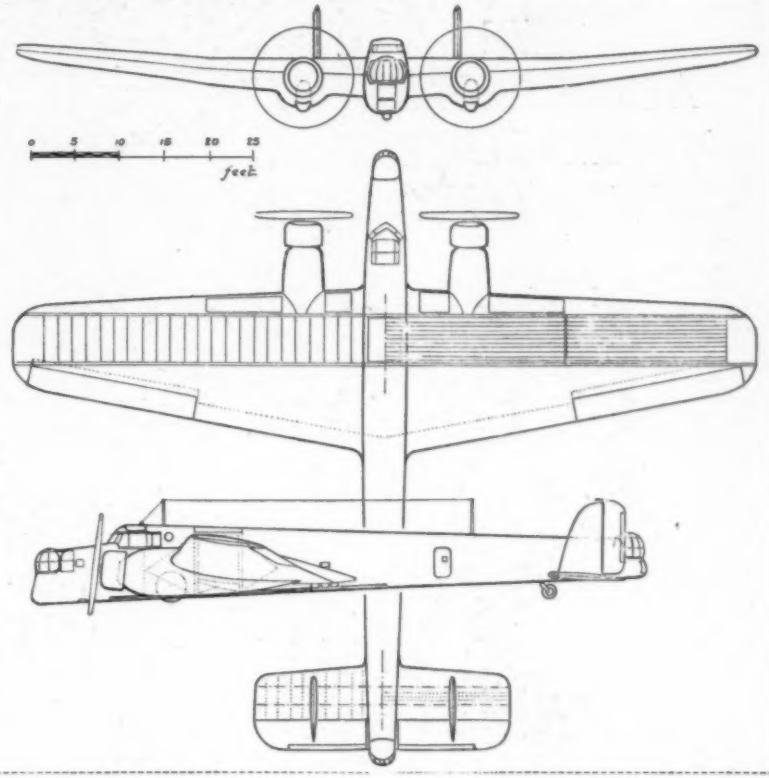
WEIGHTS

Tare weight	...	14,275 lb. (6 480 kg.)
Loaded weight	...	21,663 lb. (9 820 kg.)

PERFORMANCE

Maximum speed—	
At 7,000 ft. (2 170 m.)	192 m.p.h. (318 km.h.)
At 15,000 ft. (4 575 m.)	186 m.p.h. (300 km.h.)
Cruising speed at 15,000 ft. (4 575 m.)	160 m.p.h. (318 km.h.)
Service ceiling ...	19,200 ft. (5 869 m.)
Time to 15,000 ft. ...	27.4 min.
Range 1,250 to 1,600 miles (2 600 to 2 580 km.)	

N.B.—With Tiger VIII engines (two-speed supercharger) the performance is considerably improved. The estimated top speed with these units is 215 m.p.h.



member, the wing profile is obtained by leading and trailing edge ribs built on to the box and attached to it by simple angle brackets. The top and bottom flanges of the ribs are of the same section as that used for the fuselage stringers, viz., flat-topped Omega section. The zig-zag ties of the ribs are of open-box section, by which is meant a square-section tube formed from flat strip and having its free edges turned-in along the centre line of one of the flat sides.

The front part of the wing is covered with sheet metal (Alclad), but the rear portion, from back of spar box to trailing edge, is fabric-covered, including the flaps and ailerons.

Following the same general construction as the wing, the tailplane is a pure cantilever and carries the two fins on top, their placing being somewhat unusual at approximately the mid-point of the semi-span. The fins are braced to the top of the fuselage by horizontal struts.

So much for the airframe proper. The secondary features and military equipment are also well worth examination.

Power Plant Installation

The Twin Tiger engines are carried on welded-tube mountings of extraordinary length, permitting the retraction of the wheel forward into the nacelles. Armstrong Siddeley flexible mountings are provided, and the cowlings are of the standard Armstrong Siddeley long-chord unflapped variety, these being made in two main sections, the inner to direct the cooling air most efficiently and the outer to give a good external aerodynamic form. The airscrews are three-bladed variable-pitch two-position De Havillands without spinners.

Fuel is carried in three main tanks—two of 182 gallons capacity in the leading edge of the outer wing panels, and the third holding 155 gallons in the fuselage, coinciding, in plan view, with the spar. These tanks are riveted by the De Bergue system.

Inboard of the nacelles in the leading edge are the oil tanks, which also function as coolers.

The forward-retracting undercarriage is in two symmetrical sections, two hydraulic shock-absorbers being provided for each wheel. These are hinged at their upper ends to an arrangement of struts which permits the forward retracting motion. A fork-shaped strut runs from the wheel assembly to a point just below the rear flange of the box spar. Retraction is effected by Lockheed hydraulic jacks, the "selector" lever being by the pilot's right hand. When in the raised position a portion of each wheel is left protruding, but the under-surface of the nacelle is closed by elastic-loaded doors. Emergency lowering gear, with two handles and two locking devices, is in the gangway through the spar.

Fabric-covered Frise ailerons of fairly high-aspect ratio are used, and split trailing-edge flaps extend between these and the fuselage. Landing and take-off positions are 60 degrees and 15-20 degrees respectively.

The twin rudders and the elevator have servo flaps (also used for trimming) of unusually high-aspect ratio. A great deal of experimental work was done to give just the right sensitivity of directional control.

Bomb Stowage

The Whitley's bombs are carried in "belly" compartments in the fuselage and in cells within the wings, inboard and outboard of the engine nacelles, there being a total of sixteen pairs of doors. These doors, of wood and metal construction, open under the weight of the falling bombs, and are closed by bunjee. Two auxiliary tanks may be provided in the front fuselage bomb compartment.

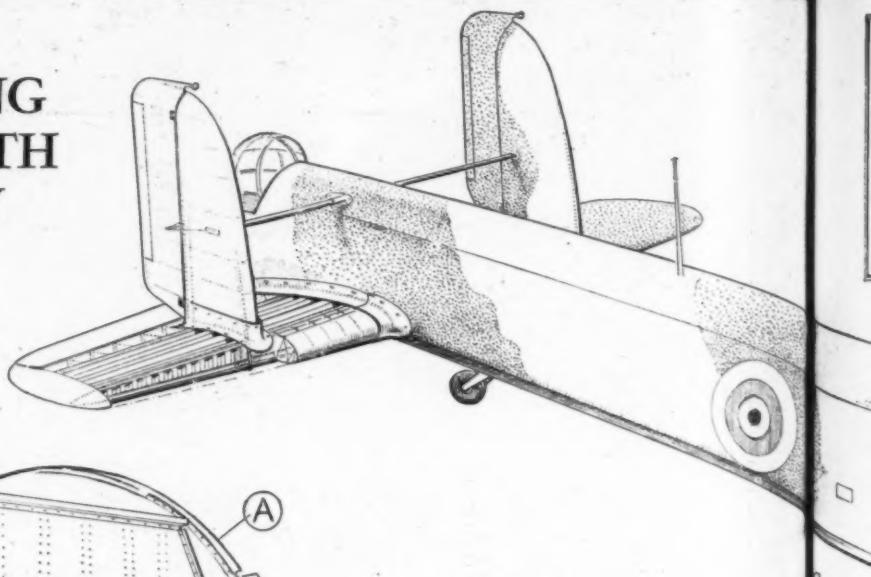
A battery of parachute flares is stowed in racks in the rear portion of the fuselage. These are released through the floor, the pilot being provided with an appropriate selector panel which has a light to indicate when the flare doors are open.

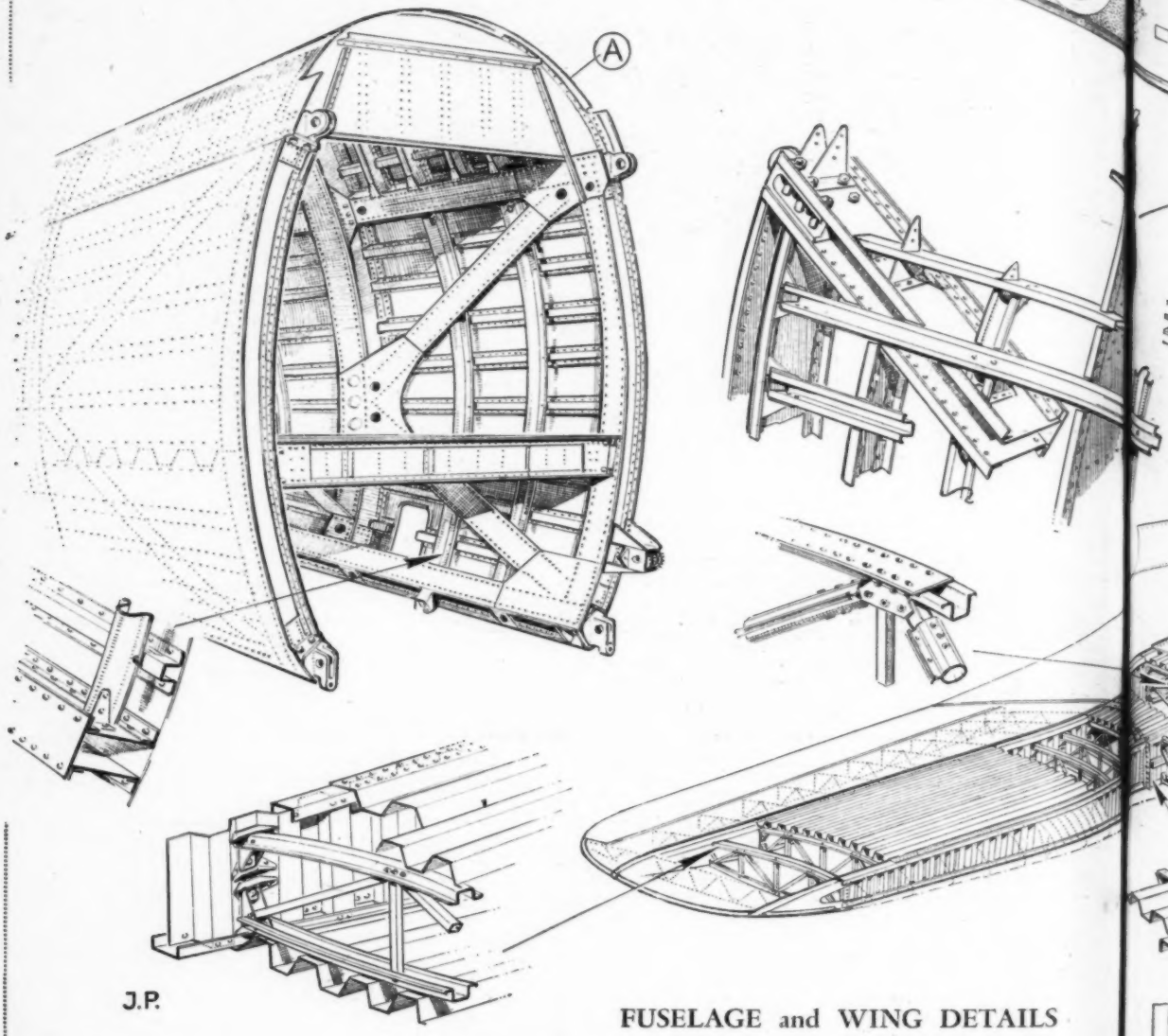
Gun turrets are fitted in the extreme nose and tail of the fuselage, and there is a retractable cupola in the bottom of the fuselage aft of the wing. Each position is provided with a most impressive array of ammunition magazines.

As usual, bomb-aiming is done from the front cockpit, which has a hinged window in the nose below the turret and a course-setting bomb sight. There is an emergency exit just behind, and further ones, incidentally, in the roof of the pilot's cabin and rear portion of the fuselage. Also in the region between the nose cockpit and the plane of the pilot's cockpit is a drift sight, a camera (optional), oxygen

THE ARMSTRONG WHITWORTH WHITLEY

A Flight *Artist's Exposition of the Main Structural Details*

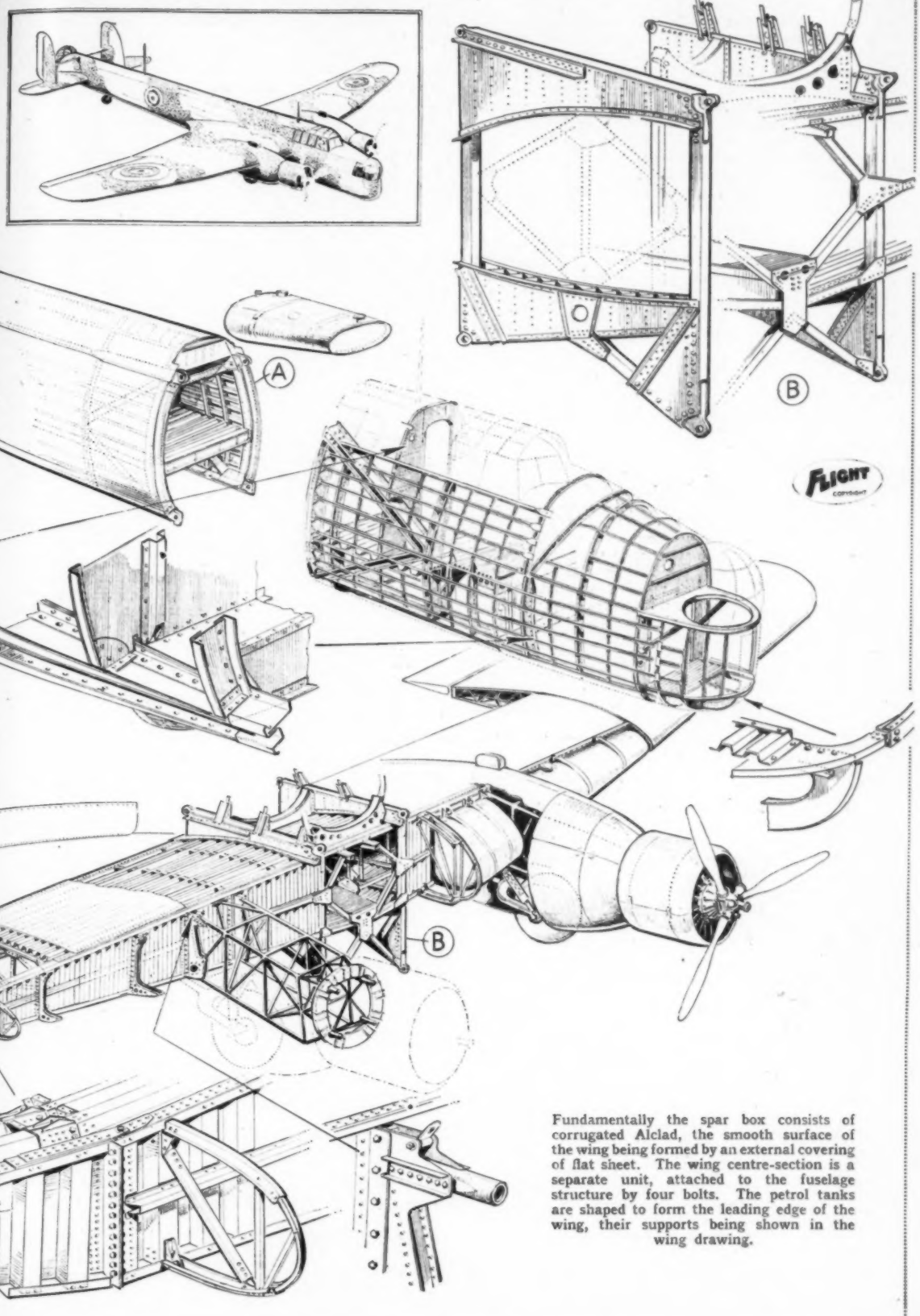




J.P.

FUSELAGE and WING DETAILS

The fuselage is a semi-monocoque in which the main frames, of box section, are riveted to the skin, while the intermediate frames, of "Omega" section, are riveted to the inside flanges of the longitudinal stringers.



Fundamentally the spar box consists of corrugated Alclad, the smooth surface of the wing being formed by an external covering of flat sheet. The wing centre-section is a separate unit, attached to the fuselage structure by four bolts. The petrol tanks are shaped to form the leading edge of the wing, their supports being shown in the wing drawing.

cylinders and the automatic pilot gear which control ailerons, rudders and elevators.

The pilots' cockpit has side-by-side seating for the first pilot (to port) and the second pilot-navigator, who has a seat on rails which can be swivelled to face astern for navigating duties, for which a chart table is provided. Dual controls may be fitted. The undercarriage lever is between the seats, with the flap control behind, and the pitch controls for the airscrews are under the throttles.

Aft of the cockpit proper, on the port side, is the wireless operator's position with a seat and writing table. Also in this neighbourhood is the control panel for the generator (driven off the port engine), gas starter gear, fuse panel, the header tank for the special fluid used in the Lockheed system, and more oxygen bottles.

The main portion of the fuselage is actually divided into upper and lower sections. The latter houses the lower gun turret when in its retracted position, spares, the flare-releasing arrangements, and the rear fuselage bomb compartment. Above the walk-way which divides the two compartments is a maintenance ladder and platform and flare stowage.

At the end of the divided section of the fuselage, on the port side, is the main door, which hinges at the bottom and embodies its own set of steps. Aft of this there is a walk-way right aft to the rear turret, which goal is attained after surmounting the tail-wheel support and the tailplane spar.

Apart from the usual comprehensive lighting equipment demanded for long-distance night flying, there are two Harley landing lights in the wing.

AIR IMPRESSIONS OF THE WHITLEY

LITTLE by little pilots are becoming accustomed to what used to be known as complications. Two years ago they did not imagine that it was possible to remember all the controls which have to be moved before and after the take-off or during the approach; to-day the undercarriage, flap, V.P. airscrew and mixture controls are simply part and parcel of the flying machine as they know it. The complications have become part of their flying consciousness; it is as natural to pump down the undercarriage and flaps and to change to fine pitch during the approach as it once was to close the throttle and wind the trimming wheel.

It is, of course, vitally necessary that control positions and arrangements should be standardised as far as possible, and this standardisation is already becoming apparent in the equipment of types for similar purposes.

The Whitley, for instance, has all its essential controls arranged tandem-fashion between the dual seats, and those for the two engines are very properly simplified, with single levers for the mixture and V.P. airscrews. Two large handles between the seats, one immediately behind the other, set in motion the hydraulic pumps which operate the undercarriage and flaps; since these handles must be twisted by means of a child's spade-grip before they are moved backwards or forwards, there is little or no chance of accidental operation. The hand wheels which adjust the elevator and rudder trimming tabs lie beside these handles, and that for the fore-and-aft trim is placed ahead of the other and in a more convenient position, so that the pilot's hand falls naturally on to it.

A really large machine must necessarily be flown largely on the trimming wheel, since it is difficult or impossible even to hold a fairly tight turn on the unassisted elevators, and the more sensitive, within reason, the adjustment, the better. Watching Mr. Greenwood, the assistant test pilot at Coventry, flying the Whitley made one realise just how light and sensitive is this machine's trim. Hardly more than a turn of the wheel, it seemed, sufficed for adjustment between the climb at full throttle in fine pitch and the glide with undercarriage and flaps down.

Such sensitivity takes the muscular element out of flying and encourages the pilot to use this control to its full advantage, both during the take-off and while motoring in to the landing. Incidentally, a large and conveniently placed wheel for adjusting the stiffness of the throttle levers on the Whitley allows the pilot to use both hands on the control column with complete mental comfort during the full-throttle take-off period. This wheel can be tightened momentarily as soon as the throttles have been pushed open to their fullest extent, and loosened again when a comfortable height has been reached.

The somewhat odd tail-up level flying attitude of the Whitley—the indirect result, apparently, of an initial shortage of complete information on flap effects—has one particular advantage. It provides the pilot with an excellent view over the nose which is not so easily obtainable, even now, in a large military machine with a forward gunner. In fact, the initial impressions of a visitor in the control cabin are those of ample space and light. The present-day middle-wing fashion makes ingress and egress through the fuselage a matter for a contortionist, but a large hatch in the roof of the cabin relieves one of any claustrophobic sensations which might otherwise be experienced.

The inveterate traveller in transport aeroplanes, with their carefully sound-proofed interiors, usually suffers when he flies in a military type. In the Whitley, by way of a change, one can *almost* talk without difficulty once the airscrew pitch has been changed, yet the two Tiger IXs are within a yard or so of one's eardrums. Such matters are medically important to the personnel when long-range operations are considered. Six or seven hours of continuous noise (with intermittent attempts at making oneself heard) must have some effect on the strongest nerves. The Whitley is as kind to its crew as it is likely to be unkind to any enemy down below.

Playing Their Part

Among firms whose products are employed in the manufacture of the Whitley may be mentioned the following:—

Aircraft Materials, Ltd.; Automotive Products, Ltd. (Lockheed undercarriages); T. M. Birkett, Ltd.; Birmabright, Ltd.; Birmingham Aluminium Castings, Ltd.; D. H. Bonnella and Son; James Booth and Co., Ltd.; Bowden Engineering Co., Ltd.; British Aluminium Co., Ltd.; British Celanese Co., Ltd.; E. G. Brown and Co., Ltd.; The Cork Manufacturing Co., Ltd.; De Bergue Patents, Ltd.; De Havilland Aircraft Co.; Dunlop Rubber Co., Ltd.; Firth Vickers, Ltd; Guest, Keen and Nettlefolds, Ltd.; Hall and Hall, Ltd.; Helliwells, Ltd.; High Duty Alloys, Ltd.; Hoffmann Mfg. Co., Ltd.; A. Lee and Sons; Light-Alloys, Ltd.; Manganese Bronze and Brass Co., Ltd.; J. Marston, Ltd.; May and Baker, Ltd. (Rhodoid); Northern Aircraft, Ltd.; Northern Aluminium Co., Ltd.; Ransome and Marles, Ltd.; Reynolds Tube Co., Ltd.; Rotherhams, Ltd.; G. Salter and Co., Ltd.; Simmonds Aerocessories Co., Ltd.; Smith's Aircraft Instruments; Sperry Gyroscope Co., Ltd.; Splintex Safety Glass Co., Ltd.; Sterling Metals, Ltd.; J. Stone and Co., Ltd; Superflexit, Ltd.; Tecalemit, Ltd.; Vickers Aviation, Ltd.

Forthcoming Events

October 21. R.Ae.S. Lecture*: "Practical Airscrew Performance," by Mr. F. M. Thomas.

October 26. R.Ae.S. Students' Section Lecture: "Detail Design" by Mr. E. Voss. R.Ae.S. Library, 7 p.m.

November 2. R.Ae.S. Students' Section Lecture: "Light Alloy Castings and Stampings" by Mr. W. C. Devereux. R.Ae.S. Library, 7 p.m.

November 3. R.Ae.S. Weybridge Branch Lecture by Flt. Lt. J. W. Summers. Vickers Senior Staff Canteen, 6.15 p.m.

November 4. R.Ae.S. Lecture*: "Problems of High-Speed Flight as Affected by Compressibility," by Mr. C. N. H. Lock.

November 5. R.Ae.S Students Section: Informal Supper.

November 12. Norfolk and Norwich Aero Club: Annual Ball.

November 16. Institute of Transport: Brancker Memorial Lecture: "Civil Aviation as a World Force," by Lord Semphill. Institution of Electrical Engineers, 6 p.m.

November 17. R.Ae.S. Weybridge Branch Lecture: "Light Alloy Castings and Stampings for Aeronautical Purposes," by W. C. Devereux, Vickers Senior Staff Canteen, 6.15 p.m.

November 18. R.Ae.S. Lecture*: "The Take-off Problem," by Mr. H. F. Vessey.

November 25. C.A.S.C.: Dance, First Avenue Restaurant, London, W.C.1.

* All these lectures take place at the Institution of Mechanical Engineers, Storey's Gate, St. James's Park, London, S.W.1, beginning at 6.30 p.m.

THE FOUR WINDS

ITEMS OF INTEREST FROM ALL QUARTERS

SIR DONALD BANKS, K.C.B., D.S.O., M.C., Permanent Secretary of the Air Ministry, has appointed Mr. L. J. Dunnett to be his private secretary.

Michael Hansen, the Dane who entered a Desoutter for the MacRobertson Race, is flying a machine of that type from Copenhagen to Capetown on a pleasure trip of about 19,000 miles.

The Latécoère flying boat, *Lieutenant de Vaisseau Paris*, is now in Morocco. In all probability she will undertake a flight across the South Atlantic, her range being considered insufficient for North Atlantic work.

Colonel Lindbergh, who came to this country nearly two years ago, intends to make a permanent home here, going to America only on short visits.

An international aircraft show will be held next May at the Mässhallen, Helsingfors. Popularly known as the SILI (an abbreviation of the long Finnish title), the show will be staged under the patronage of H. E. Kyösti Kallio, President of the Finnish Republic.

A Burnelli UB-14 transport — presumably the demonstration machine—has been delivered to the Aviolanda factory at Papendrecht, Holland. Possibly this concern intends to build the type under licence.

This evening, before the R.Ae.S., Mr. F. M. Thomas, A.F.R.Ae.S., of the D.H. Airscrew Division, will lecture on "Practical Airscrew Performance Calculations."

The paper, it is said, is the most thorough digest of airscrew theories and their practical application which has yet been made. It will be read at 6.30 p.m. in the Lecture Hall of the Institution of Mechanical Engineers, Storey's Gate, London, S.W.1. Non-members of the Society will be admitted only by tickets obtainable through members.

THE HAND OF FRIENDSHIP : Last Monday the party of German Air Force officers who are visiting England as guests of the Air Council were welcomed at the Air Ministry by Lord Swinton, who is seen shaking hands with General Milch, the German Air Minister. The party afterwards went on to see the Army Co-operation units at Odiham, and on Tuesday visited Mildenhall. On the left of the group is Major General Ernst Udet, the famous war pilot, who is Chief of Technical Staff.

Mr. R. K. Pierson has accepted the presidency of the recently formed Weybridge branch of the R.Ae.S.

U.S.S. *Yorktown*, the American Navy's latest and most efficient aircraft carrier, has been commissioned after the rectification of certain mechanical defects which arose during preliminary trials.

The technical section of K.L.M. has acquired a new zinc-spraying plant which is claimed to render fireproof the cabin interiors of their D.C.2s. The D.C.3s are treated in America before delivery. K.L.M. has lately been making intensive efforts toward avoiding a repetition of the *Uiver* disaster.

Miss Jean Batten took her Percival Gull off from Richmond, New South Wales, at 5.55 on Thursday morning in an attempt to break Mr. Broadbent's solo record (6 days, 8hr. 25min.) from Australia to England. She was forced to land at Winton, Queensland, with minor oil-gauge trouble.

Continuing, Miss Batten reached Darwin on Monday and left there at 6 a.m. on Tuesday (9 p.m. Monday, G.M.T.). She was sighted over Koepang, in the Timor Sea, 2hr. 10min. later.

THE GRIM SETTING : More vividly than any words, this Imperial Airways photograph of the Sudd swamps between Khartoum and Malakal shows the nature of the country in which Brig.-Gen. and Mrs. A. C. Lewin were marooned for a week after making a forced landing on their way home to Kenya. After three days they were sighted by the Empire flying boat *Cassiopeia*, and supplies were afterwards dropped by the R.A.F. On Monday they were reached by a native rescue party, which had taken four days to cover fifteen miles.

Twenty-five Years Ago

(*From "Flight," October 19, 1912.*)

"The Baby dirigible built by Messrs. E. T. Willows, of Cardiff, for the British Navy, has made a very favourable impression at Farnborough. The little torpedo-shaped car for the pilot and his assistant, which is slung beneath the main beam running fore and aft, gives the aircraft a very smart and business-like appearance, and the 35 h.p. Anzani engine, driving two four-bladed Rapid propellers, has shown itself capable of giving the airship a speed of over 50 miles an hour."

HERE and THERE

The Diesel

"Diesel Aircraft Engines," by Paul H. Wilkinson. Published at $4 by the Author, at 201, West 16th Street, New York.

NOTWITHSTANDING the fact that the use of fuels of 100-octane number promises to endow the petrol engine with consumptions almost as low as those associated with the compression-ignition engine, there is a large volume of opinion which still believes that sooner or later the diesel aero engine will come into its own, for certain specialised work at any rate. Those, and others interested in the subject of diesel engines, will find a wealth of useful information in this book, written and published by an Englishman now domiciled in the United States. Mr. Paul H. Wilkinson is not unknown in British aviation circles, having been formerly associated with A. V. Roe and Co., Ltd., and with the Royal Aircraft Establishment at Farnborough.

"Diesel Aircraft Engines" has been carefully planned and compiled and is very well produced, the printing being good, the illustrations clear and the general arrangement such as to be handy for reference while still containing the detailed information which the serious student will look for.

After two forewords, one by Mr. Charles Lawrance and the other by our own Lt. Col. Moore-Brabazon, there is a brief history of the development of diesel aircraft engines in the different countries. Then comes a section dealing with aircraft types which have used the diesel, and then a section giving the essential data relating to fourteen modern diesel aero engines. This section is illustrated with full-page photographs.

The rest of the book is devoted to an illustrated description of the constructional details of the different diesels, the grouping under radials (two-stroke and four-stroke) and in-line (two- and four-stroke), assisting in avoiding confusion. A chapter on future development examines the lines along which further progress is likely to move, and the book concludes with tabulated data in English and metric units of experimental and present-day diesel engines.

Fuel-gauge Simplicity

APART from one or two vital flying instruments, an accurate fuel gauge is the most important item in an aeroplane's indicating equipment.

A gauge that gives the required results by the simplest means is obviously desirable, and simplicity is the keynote of the latest K.D.G. "Nutsford" gauge, which is stated to have shown complete reliability in flight tests on both deep- and shallow-tank aircraft. Known as the Mark VIII, it embodies certain improvements, particularly in reduction of weight in the connections.

Primarily, the instrument consists of a metal pressure box externally attached to the base of the fuel tank, fuel being admitted to the box by a small communicating hole. A braided capillary tube connects the bellows in the pressure box with a metal dilating capsule in the indicator on the pilot's panel. The capillary tube, bellows and capsule contain a small volume of transmitting gas, and the capsule, expanding or contracting under the influence of the bellows, operates an indicator in the conventional fashion.

As the fuel tank and indicator case have vents at adjacent points in the slipstream, the difference in pressure between the inside and outside of the indicator capsule gives the head of fuel in the tank irrespective of air speed or altitude pressure at the vents.

The makers are the Korect Depth Gauge Company, Ltd., Parliament Mansions, Victoria Street, London, S.W.1.

A Film About Steel

THE co-operation of Thomas Firth and John Brown, Ltd., with the Gaumont-British Company has resulted in the production of two most instructive films on "Modern Steelcraft."

Each process in the production of steels—in particular, "Staybrite" stainless steel—is shown briefly; while close-up pictures of furnaces being charged, the pouring of the metal into moulds, the rolling of ingots into sheet and bar form, and the forging of other very large ingots in a 6,000-ton press or with steam drop hammer are most spectacular.

The films are for distribution to societies, clubs and schools in the country and abroad, and have been produced in two sizes.

Arrangements for the borrowing of the films and, if necessary, a projector with or without sound apparatus, can be made with the Sales Promotion Department of Firth, Brown, Ltd., at Sheffield.

YET ANOTHER U.S. DESIGNATION: Major Alexander de Seversky takes off in the so-called "Convoy Fighter" (Wright Cyclone) referred to in the Foreign Service News on page 406 of this issue.

Hangar Doors

MANY people are familiar with the "Eclair" balancing door as fitted to aircraft hangars and other structures in which it is particularly desirable that the door, when open, shall occupy the minimum amount of space.

The "Eclair" door lifts with a vertical motion that becomes translated into a horizontal one, until eventually it lies in a horizontal position, level with the top of the span, thus leaving the entry absolutely unobstructed.

Hitherto made by Hawkes and Snow, Ltd., these doors will in future be manufactured by a company specially formed for the purpose—Eclair Doors, of Priory Works, Shirley, Birmingham. The managing director is Mr. C. E. T. Cridland.

Going West

FOR several years W. S. Shackleton, Ltd., have kept in very close touch with American aviation, and not a few are the British items which they have reciprocally introduced across the Atlantic. Mr. J. H. C. Beard, Mr. Shackleton's co-director, is leaving for America on November 6 in the *Bremen* and will make a tour of the United States. It is known that the firm is interested in certain American aircraft artillery, so that perhaps it is logical to guess that Mr. Beard's visit is not unconnected with this subject. He will, however, make it his business to examine anything in the aviation line which promises to have applications on this side, and there is no telling what he may bring back.

Better Costing Systems Advocated

NEED for more accurate costing in the aircraft industry was stressed by Mr. S. J. Noel-Brown, secretary of General Aircraft, in a lecture to the Association of International Accountants at Birmingham on Thursday.

Mr. Noel-Brown said he feared it was true that the British aircraft industry was a long way behind in this respect. Expansion had produced a fleet of orders which were placed on an "instruction to proceed" basis, with prices to be agreed after production had started. This was a makeshift system, open to obvious abuses and the only solution appeared to be the installation of modern costing methods on a standard basis.

Mr. Noel-Brown suggested a standard system of modern costing giving certain information which would be accepted by Air Ministry officials without dispute, coupled with investigation apart from ordinary audit. He also emphasised the need for obtaining reliable information more quickly than was usually possible by the job-card system. He favoured the time-card system, by which men clocked on and off their different jobs. By the simple process of having a number of time-clerks spread over the various factory departments the daily allocation of the complete labour of the factory was a fairly easy matter. Spread over a week this system also meant the complete allocation of the wages paid. It was also possible to see the total cost of productions wages for a day or other period throughout the entire factory, the total productive labour costs against a particular order, the productive cost of a particular department and the different classes of labour employed in relation to the totals. In addition the information showed ordinary wages, overtime wages and bonus wages.

OVERWEATHER THERAPEUTICS

By the Chief Photographer of "Flight."

IN a world of ever-added complication and nervous tension one sometimes wonders whether all our cleverness makes us one whit happier than were our forbears.

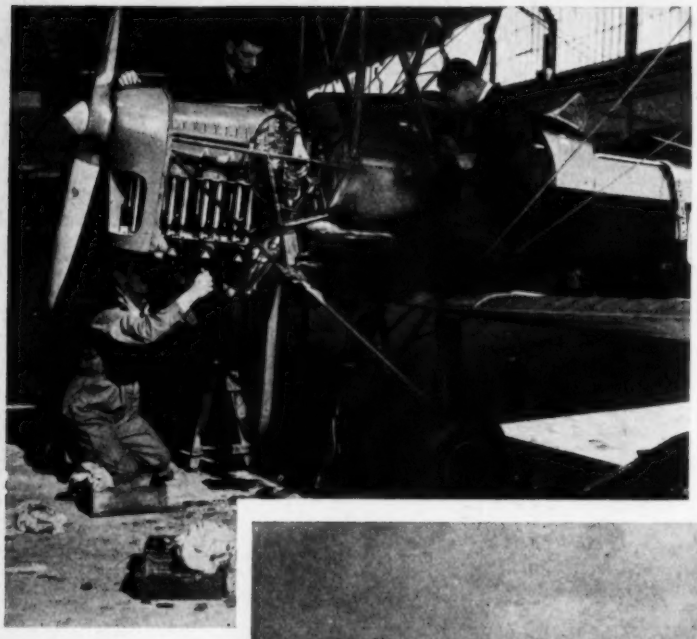
Yet in one respect there is no possible room for doubt, and that is in our conquering of the new world above the clouds. It has yet to be realised by non-flying people that, during daylight hours, one can always find brilliant sunshine, a blue sky and champagne-like air on the other side of the cloud roof. In addition, one sees a never-ending, ever-changing, beauty of light and shade in the cloud formations. Unknown to most of the inhabitants of the grimiest towns, within a mile of them are all the real advantages of a perfect health resort waiting to be used every hour of the day. Flying in such circumstances, when nerves are frayed somewhat by mundane matters, brings an exhilaration almost spiritual in its intensity, doubtless caused largely by a sense of super-freedom and conquest of illimitable space. It is interesting to note that "8,000ft. for 45 minutes" now appears in medical books as a definite cure for a cold.

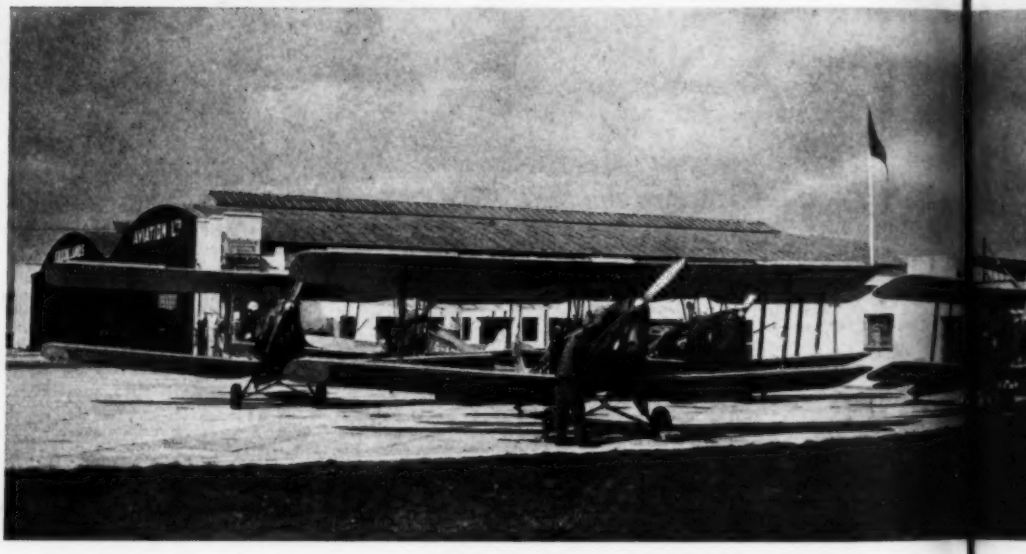
The picture shown here of the De Havilland Albatross, undergoing routine tests for the Air Ministry, was taken on an exceptionally beautiful day for October, and to fly alongside this piece of silver loveliness against an ever-changing background of sunlight and shadow was sheer delight. The second photograph, of the Tiger Moth, which looks rather upset in the hands of Test-Pilot Buckingham, was obtained on quite a different occasion. Below the clouds it was just an ordinary grey overcast autumn day, yet here again are blue sky and sunshine unlimited.

FROM THE ASHES

(Illustrated with "Flight" photographs.)

ALMOST exactly a year after the disastrous fire which entirely destroyed the service hangar, Brooklands Aviation is now installed in a new and much-improved building. This, as the photographs show, is extraordinarily well laid out and incorporates the normal service hangar, a large maintenance department and engine shop, with offices, lecture rooms and stores, according to modern practice, forming the two walls. The new building has been erected in a very short time on the original site at the back of the control building, Boulton and Paul organising the steelwork and Courtney and Fairbairn the masonry. Already the building appears to be chock-a-block with airframes and engines in for C. of A. work, and with the many private owners' machines which are normally housed at Brooklands, Captain Duncan Davis may well be proud of his organisation.

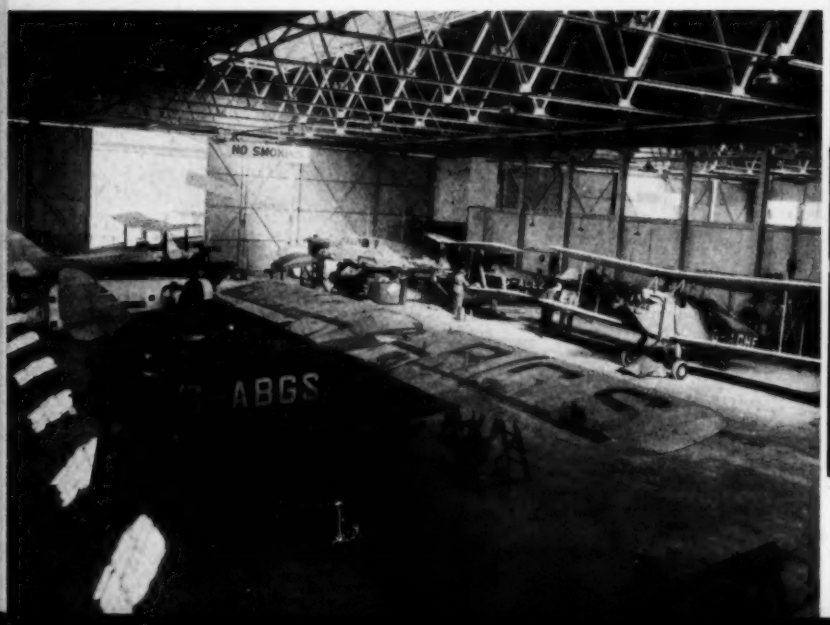




(Above)
"Twenty-Five-Hour": At work on one of the Club Tigers—now the standard training type at Brooklands.

(Right)
Panorama: The new building can be seen behind the Club fleet, which is lined up on the tarmac in the centre picture.

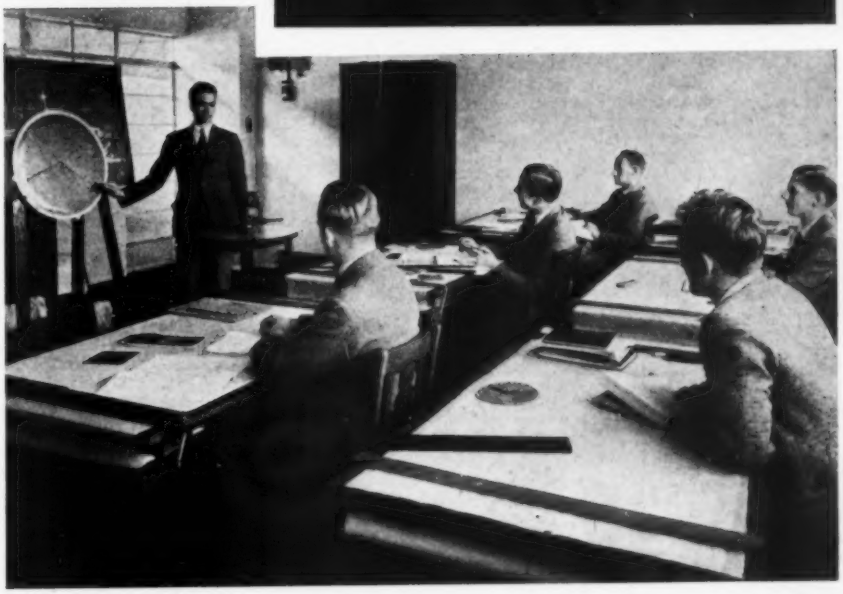
Maintenance: A few of the machines which are now going through their C. of A.s, or being otherwise attended to, can be seen in the picture of the maintenance department below. On the left of the shop, and outside the picture, are the dope and fabric shops, the bonded stores and various administrative offices. Inset, on the right, is the attractive reception office.



Filling up : The refuelling and " re-oiling " pumps (above) are all conveniently concentrated at the tarmac end of the new building. The oil, incidentally, is supplied under pressure through a number of filters.

The Skipper's Office : Modern "built-in" furniture and a " loud-speaker " inter-office telephone system (with clock and indicating calendar) are features of Capt. Duncan Davis's own office, which can be seen on the right (above). When this photograph was taken it had been inhabited for only two days or so and lacked that comfortable " lived-in " atmosphere.

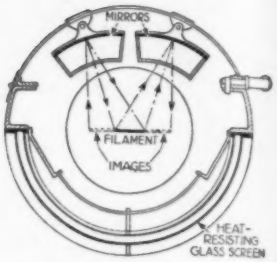
Lecture : On the right is seen the navigation lecture-room, complete with " pupils," which is in charge of Mr. Bob Ashton. The man-size course-and-distance calculator, which was the subject of instruction at the time when this photograph was taken, is a useful idea. The " demonstration " compass base can be seen in front of Mr. Ashton's left arm.

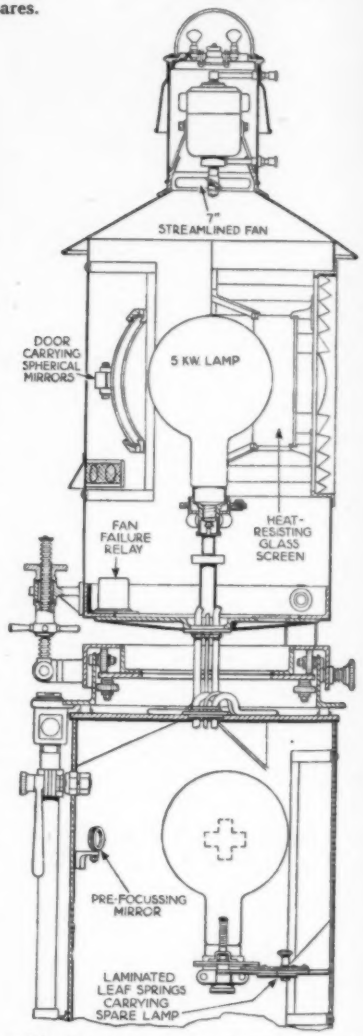


MOBILE LIGHTHOUSE

Chance Bros. Design for R.A.F.

On the right is shown how the images from two decentred, spherical mirrors give a three-filament effect. The main diagram below shows the cooling fan, lantern and prefocused spare bulb. In the lower part of the pedestal (not shown), are kept lantern spares.





NO half-measures were to be considered when the Air Ministry placed an order for new mobile aerodrome lighting equipment for all fighter and bomber squadrons, and the elaborate (yet simply operated) self-contained floodlights now in production at Birmingham are more closely akin to the lighthouses for which the Smethwick firm of Chance Bros. have been famed for more than sixty years than to floodlights as we know them.

Four main components go to make up a single unit, for on a Brockhouse trailer is mounted a Coventry Climax engine (R.A.C. rating 16.9 b.h.p.) which drives an E.C.C. generator supplying power to the 5 kW. floodlight.

The Coventry Climax E-type engine is of orthodox design, with a power output of 10 h.p. at 1,000 r.p.m. Enough petrol is carried in a tank slung under the trailer for sixteen hours continuous running. The engine and generator have Silentbloc anti-vibration mountings, and a Silentbloc flexible coupling is used for the drive to the compound-wound generator. This generator, which has a continuous rated output of 5.5 kW. at 100 volts, has specially impregnated windings that make it suitable for tropical operation. Gauze-covered air-cooling ducts are fitted.

Auxiliary Generator

In the generator compartment is also fitted a small 12-volt generator to charge the Nife accumulators for interior and exterior lighting. A neat and well-grouped instrument panel is located at one end of the generator housing, which is of sheet steel, zinc sprayed.

The Brockhouse trailer is the three-ton model with independent torsion-bar springing. All four wheels have Lockheed servo-assisted brakes. A large hand parking-brake lever is also fitted on the near side.

Externally, the dioptric floodlight, as it is styled, is made up of a metal cylindrical lantern with a glass optic covering a horizontal angle of 180 deg. It is interesting to examine the detail work of the light unit. In the case of the optic, five prismatic refractors of ground and polished lighthouse glass are placed each side of a central lens belt. The refractors, each of which has a different angle, are cemented together and the whole is held in a gunmetal frame. The resulting beam is flat-topped and, without dazzling the pilot, illuminates an area which permits a runway in any direction of approximately 1,400 x 750 ft. in clear atmosphere. According to the British Standard Specification the minimum illumination in the area must be 0.2 foot candles, assuming no atmospheric absorption. A metal protecting shield is fitted when the light is not in use.

Between bulb and optic is placed a heat-resisting screen of anti-infra-red-ray glass, covering two right angles. Six brackets on the optic frame support the screen, and phosphor-bronze clips hold it in position and protect it from vibration.

Two spherical decentred mirrors focused on the bulb filaments have their images one on each side of the filament, giving in effect three filaments for one, so, it has been found, increasing the axial beam by 70 per cent. over that given by a single mirror. These mirrors are held in cast aluminium frames on asbestos pads and have adjustments for accurate focusing.

Cooling is by a 7 in. electric fan located above the conical top cover, driven by a Keith and Blackman motor having an impregnated winding for tropical operation; this draws air through the lantern from gauze-covered air inlet holes in its aluminium base. A failure relay for the motor lights a small red lamp outside the lantern as warning. The lamp itself is a 5 kW 95-105 volt D.C. size with two flat grid filaments arranged in parallel, so that if one filament fails the other can continue to function until replacement without a total black-out ensuing. In the supporting column of the lantern a spare bulb and holder are housed, prefocused on two white targets in their cabinet. Replacement thus entails a simple exchange of holder and bulb and the new parts are prepared for immediate operation. The bulb holder is of a sprung-leaf type to lessen the effect of vibration during transport. When in use, however, it is held rigid by clamps.

The lantern is mounted on a combined turntable and support, which also incorporates hinged lugs for elevation and depression together with location plunger and locking handwheel. Five degrees of movement are possible in each direction.

Foot-operating levelling jacks with hand locking and adjustment are also included in the design, and the swivel joints employed are fitted to rubber blocks which insulate the lamp from engine vibration. The level is checked by two fixed spirit levels on the turntable support.

A further precaution demanded in this most thorough specification is the plating or metal-spraying of all exposed bolts, pins, etc., and zinc-spraying and painting of the inside and outside of lantern, turntable and supporting cabinet. Spare bulbs, globes, mirrors, heat-resisting screens, generator brushes, engine and trailer spares and tools are carried.

SERVICE AVIATION

Royal Air Force and Fleet Air Arm News: Official Announcements: Military Aviation Abroad

CLOSE COMPANY: Hawker Demon two-seater fighters (de-rated Kestrel V) of No. 64 (F) Squadron caught by the *Flight* camera immediately after a formation take-off at Martlesham Heath.

Our German Guests

A PARTY of officers of the German Air Force, headed by General Milch, the Air Minister, arrived at Croydon on Sunday afternoon in a Heinkel He. 111 on an official visit as guests of the Air Council. General Milch is accompanied by Lt. Gen. Stumpff, Major Gen. Udet, Lt. Col. Polte, Major Nielsen and Major Kreipe. The visitors were received by Group Capt. J. L. Vachell, Wing Cdr. R. V Goddard, and other officers. On Monday, after being received at the Air Ministry by Lord Swinton, the visitors were presented to H.M. the King. They later visited Odiham, where Hectors demonstrated Army co-operation. On Tuesday the party went to Mildenhall, where there was a display featuring especially the latest types of heavy bombers. Visits are also being paid to Cranwell and Halton, and to certain aircraft factories.

Lord Harewood

THE Earl of Harewood has been appointed Hon. Air Commodore of No. 609 (West Riding) (Bomber) Squadron of the Auxiliary Air Force.

H.M.S. "Glorious"

THE aircraft carrier *Glorious* (Capt. B. A. Fraser, O.B.E., A.D.C.) is to leave Malta on October 25 for England on the conclusion of her commission. She will call at Gibraltar on the 30th and should reach Devonport on November 3. The *Glorious* will probably recommission in January.

Moves, etc., of Units

HEADQUARTERS, No. 30 (Balloon Barrage) Group, moved from 33-34, Tavistock Place, London, W.C.1, to Kelvin House, Cleveland Street, London, W.1, with effect from October 8.

No. 5 (Bomber) Group moved from Mildenhall to St. Vincents, Grantham, with effect from October 2.

The name of the range for No. 8 Armament Training Camp has been changed from Dornoch to Tain.

The Trainer Hind

AN Air Ministry order states that the official name of the Hind aeroplane fitted with dual control for *ab initio* training is Hind (T). It will, of course, be commonly known in the Service as the Trainer Hind or Hind Trainer, following the familiar designation of the Hart (T).

This new version of the Hind will be developed from the standard Hind light bomber design by fitting complete dual control and a special rear cockpit with parachute seat. It will be an advance over the Hart Trainer in that its performance at altitude will be much superior, thanks to the fully supercharged Kestrel V engine of 600/640 h.p.

Perhaps the Air Ministry may decide, as the Hind becomes obsolescent as a light bomber, to modify the Service Hinds for training duties, thereby acquiring a very strong force of high-performance instructional biplanes. Unfortunately they will not reproduce many of the salient characteristics of contemporary front-line aircraft, but, judging from the large numbers of hard-worked Hart Trainers now in use, they will undoubtedly find wide application.

With the Kestrel V engine the maximum speed of the Hind (T) at 14,000 ft. should be something like 200 m.p.h.

Reunion Dinners

THE R.N.A.S. (Dunkirk Command and others) reunion will be held at the Stadium Club, Holborn, on November 13. The secretary is Mr. C. Swingland, 63, Dumbreck Road, Eltham. London, S.E.9.

The seventh annual reunion dinner of the officers of No. 600 City of London (Fighter) Squadron will be held at the May Fair Hotel, London, next Saturday, October 23, at 7.15.

University Commissions

THE following University candidates have been selected for appointment to permanent commissions in the General Duties Branch of the Royal Air Force:—W. M. Bisdée (Cambridge), R. F. H. Clerke (Cambridge), K. V. Garside (Oxford), G. de L. Harvie (Oxford), W. O. C. Hemmings (Cambridge), A. K. Hunter (London), C. C. Law (Oxford), I. L. McLaren (St. Andrew's), R. J. P. Prichard (Cambridge), C. H. Simpson (Cambridge), A. M. Taylor (Oxford), P. D. Walker (Oxford), F. A. Willan (Oxford).

It will be noted that in this list six officers come from Oxford, five from Cambridge, one from London, and one from St. Andrew's. This is probably the first list in which Oxford has contributed more officers than Cambridge. The numbers from London are sure to increase when the establishment of the U.L. Air Squadron goes up from 50 to 75. The success of a St. Andrew's man is welcome, as that is one of the oldest residential universities in Great Britain.

Flying Accidents

THE Air Ministry regrets to announce the following accidents:—P/O. James Laurence Wells lost his life as the result of an accident which occurred at Cranfield, Bucks, on October 12, to an aircraft of No. 82 (B) Squadron. He was the pilot and sole occupant of the aircraft.

A.P/O. Richard Vivian Peacock, Reserve of Air Force Officers, is missing and believed to have lost his life in an accident which occurred at sea in Lunan Bay, Montrose, on October 14 to an aircraft of No. 8 Flying Training School, Montrose, Angus. A.P/O. Peacock was a passenger of the aircraft. The pilot, A.P/O. John Goodhart Mason, was slightly injured.

Lt. William Ronald Harley, Royal Navy, Flying Officer, Royal Air Force, is missing and believed to have lost his life as the result of an accident which occurred at sea in Moray Firth on October 11 to an aircraft of No. 801 (Fleet Fighter) Squadron, embarked on H.M.S. *Furious*. He was the pilot and sole occupant of the aircraft.

Boy Entrants

IT is announced that vacancies for four hundred boy entrants, to be trained in the trades of armourer, photographer, and wireless operator, will occur in January next. Applicants are required to have had an education such as that of boys who have attended secondary, junior technical, central and similar schools. The date by which applications must reach the Air Ministry has now been advanced to December 15. Full particulars as to pay, terms of service, etc., are contained in A.M. Pamphlet 54, which may be had (free of charge) from the Inspector of Recruiting (Boys' Department), Royal Air Force, Victory House, Kingsway, London, W.C.2.

Royal Air Force Gazette

London Gazette, October 12, 1937

Capt. D. C. J. Miller, 17th/21st Lancers, is granted a temporary commission as Flight Lieutenant on being re-seconded for duty with the Royal Air Force (October 2).

The following Flying Officers are promoted to the rank of Flight Lieutenant on the dates stated:—A. V. Sawyer (September 16); R. C. MacK. Ferrers (Lt., The Cameronians), K. J. McIntyre (Lt., Royal Tank Corps), R. E. Weld (Lt., Royal Tank Corps) (September 17) (seniority September 17, 1936); C. R. Taylor, J. S. Bartlett, H. West, F. C. Scott (September 24).

Wing Cdr. J. L. Vachell, M.C., is granted the acting rank of Group Captain (unpaid) (October 16).

F/O. A. Foord-Kelcey is granted the acting rank of Flight Lieutenant (October 1).

Air Comdre. J. B. Bowen, C.B.E., is placed on the retired list at his own request (October 4).

Flt. Lt. D. R. Keiller is transferred to the Reserve, Class A (October 1).

Flt. Lt. S. M. Mosley is transferred to the Reserve, Class C (October 1).

Lt. Cdr. J. E. Burstall, R.N., Flight Lieutenant, R.A.F., relinquishes his temporary commission on return to Naval duty (July 29).

The following Flying Officers are promoted to the rank of Flight Lieutenant with effect from September 7 and with seniority of the dates stated:—D. J. Dawson, M.R.C.S., L.R.C.P. (September 7, 1936); N. P. R. Clyde, M.B., Ch.B. (January 31).

Dental Branch

The following Flying Officers are promoted to the rank of Flight Lieutenant (September 7):—A. C. Wilkie, B.D.S.; C. H. Beamish, L.D.S.; E. Martin, L.D.S.

Chaplains Branch

The Rev. T. M. Jones, B.A., is granted a permanent commission (October 10).

Royal Air Force Reserve

General Duties Branch

Flt. Lt. A. N. Kingwill is granted a commission in that rank in Class A with effect from October 5 and seniority of November 16, 1927.

Major W. H. Day is granted a commission as Flight Lieutenant in Class C (September 13).

The following relinquish their commissions on the dates stated on completion of service and are permitted to retain their rank:—Flt. Lt. C. S. Staniland (March 15); F/O. E. P. Clacey (September 23).

No. 609 (WEST RIDING) (BOMBER) SQUADRON.—The Right Hon. the Earl of Harewood, K.G., G.C.V.O., D.S.O., T.D., Personal A.D.C. to the King, is appointed Honorary Air Commodore (October 12).

Royal Air Force Intelligence

Appointments.

General Duties Branch

Wing Commanders.—C. A. Stevens, M.C., to Headquarters, R.A.F., Aden; for duty as Senior Air Staff Officer, 5.10.37. R. St. H. Clarke, A.F.C., to Aeroplane and Armament Experimental Establishment, Martlesham Heath; for Armament duties, 23.9.37.

Squadron Leaders.—J. C. Foden, A.F.C., to No. 166 (B.) Squadron, Leconfield; to command, 1.10.37. W. G. H. Ewing, to Headquarters, R.A.F., Aden; for Personnel Staff duties, 13.9.37. T. J. E. Thornton, to Headquarters, Bomber Command, Uxbridge; for Signal duties, 27.9.37. C. Rapley, to Aircraft Depot, Dhibban, Iraq; for Engineer duties, 5.10.37.

Flight Lieutenants.—A. L. Christian, to No. 5 F.T.S., Sealand, 18.9.37. K. Lea-Cox, to No. 6 F.T.S., Netheravon, 18.9.37. H. A. Simmons, to No. 84 (B.) Squadron, Shaibah, Iraq, 5.10.37. W. T. H. Nichols, to No. 5 (A.C.) Squadron, Chaklala, India, 1.10.37. G. Nelson, to Headquarters, R.A.F., India, New Delhi, 5.10.37. H. G. Blair, to No. 28 (A.C.) Squadron, Ambala, India, 5.10.37. J. M. D. Ker, to Aircraft Depot, Karachi, India, 5.10.37. R. S. Darbishire, to School of Naval Co-operation, Lee-on-the-Solent, 15.9.37. N. W. A. Cullum and M. V. Ridgeway, to R.A.F. Station, Gosport, 24.9.37.

Accountant Branch

Squadron Leader.—J. H. S. Richards, to Headquarters, Bomber Command, Uxbridge; for Accountant duties, 11.9.37.

Equipment Branch

Flight Lieutenant.—E. J. H. Starling, to Headquarters, R.A.F., India, New Delhi, 5.10.37.

Medical Branch

Squadron Leader.—S. B. S. Smith, to Headquarters, Bomber Command, Uxbridge; for duty as Medical Officer, 4.10.37.

Flight Lieutenant.—F. W. P. Dixon, M.B.E., to Central Medical Establishment, London, 8.10.37.

Dental Branch

Flight Lieutenant.—O. F. Brown, to R.A.F. Station, Andover, 1.10.37.

Considerations of space make it necessary for "Flight" to omit ranks below that of Flight Lieutenant from the above lists, which, as a result of Royal Air Force Expansion, have greatly increased in length.

FOREIGN SERVICE NEWS

D.21s for Denmark

THE Danish Army Aircraft Factory at Copenhagen has started work on a batch of Mercury-powered Fokker D.21 single-seater fighters, with which a new squadron will be equipped. The D.21, with Bristol Mercury VII (830 h.p. max.) is claimed to be capable of 276 m.p.h. and to climb to 19,700 ft. in about 7½ min. It is of typical Fokker composite construction and has a fixed undercarriage. Fokker is building a batch for the Dutch Government.

Sweden Steps Out

ACCORDING to what should be a reliable source, the Swedish Government will buy no more service aircraft from abroad. All military machines will in future be built in Sweden. Accordingly, the Svenska Aeroplan concern is erecting works at Trollhättan and the Swedish State Railway factory at Linkjöping is being enlarged. Co-operative production of Northrops is planned for next year, the licence and European selling rights for these machines having been acquired by the company in question. A new light-bombing squadron will be equipped with the first Swedish-built Northrops. Further machines may be exported. Incidentally, the Swedish Air Force has asked the Government to grant something over 41½ million kronor on the 1938-39 budget, as compared with an allowance of about 30 million kronor in 1937-38. The increase is chiefly due to expansion.

Economy—and a "Convoy Fighter"

MAJOR ALEXANDER P. DE SEVERSKY is to be congratulated on the fine results he seems to be obtaining from his military aeroplanes. His company has been formed only a short time, but already it is in production with a substantial batch of single-seater Twin-Wasp-powered pursuit monoplanes, said to be remarkably strong and manœuvrable and to do over 300 m.p.h., for the U.S. Army Air Corps. Similar machines, stripped for racing and operating on 100-octane fuel, made a good showing at the National Air Races. One has made the fastest time across America and Miss Jacqueline Cochran used another to break the women's international speed record. A few Seversky amphibian fighters have been acquired by the Colombian Government and negotiations are proceeding with a view to selling advanced trainers and two-seater fighter-bomber-attack machines to Latin-American countries.

Now Major de Seversky knows the value of the more arresting kind of publicity, so he has broadcast the claim that the Cyclone-powered two-seater he plans to demonstrate in South America represents a new class of military aircraft which he has been pleased to call the "Convoy Fighter"—as though the Americans have not already afflicted the military aircraft market with enough cryptic nomenclature. Actually, so far as can be gathered, this convoy fighter is nothing more or less than a high-performance two-seater which operates to its greatest advantage as a two-seater fighter, but may be adapted for light bombing or attack duties. What is interesting, however, is the fact that the same machine, with an engine in the 400-500 h.p. category and with 250 sq. ft. of wing area instead of the 220 sq. ft. of the fighter version, may be used as a trainer.

This means that an impecunious air force which wants trainers, fighters, light bombers and attack machines can standardise on fuselages, centre-sections, and undercarriages and acquire alternative sets of engine bays and power plants and two types of outer wing panel. A photograph of the fighter appears on page 404.

A Significant Order

ABOUT three weeks ago Admiral Arthur J. Hepburn, U.S. Navy, received an order directing him to make the following reorganisation effective as from the 1st of this month:—

1. "Transfer all destroyers now in Scouting Force to the Battle Force."
2. "Transfer all patrol plane squadrons, minus the Utility Wing, to the Scouting Force from the Aircraft Base Force."
3. "Transfer administration of the Utility Wing from the U.S.S. *Wright* to the U.S.S. *Rigel*, receiving ship at the Destroyer Base, thus making this plane unit an integral part of the Base Force.

The gist of this, being interpreted, is that the 176 Consolidated patrol-bomber flying boats ordered by the U.S. Navy have, to quote once more, "replaced Scouting Force destroyers as the first line of war craft to contact the enemy."

The recognition of the long-range flying boat units as reconnoitring arms is, of course, not new. The real significance of the above order is that these Consolidated machines will be called upon to operate virtually as part of the Fleet. Apart from reconnaissance work they will be exercised as bombers against the vanguard of an enemy force.

The Hafner Gyroplane in this photograph has taken off from a standstill on the compass base seen a few yards to the rear. (*Flight* photograph.)

Mr. Hafner in the Rôle of Diviner : Fundamentals of Windmill Flight Explained

GYROMANCY

RARELY in the long and distinguished history of the Royal Aeronautical Society has a lecturer managed to please and satisfy every section of his audience. Generally the unfortunate speaker must perforce talk right over the heads of some of those present (for let it be not thought that *all* who attend the meetings of the R.Ae.S. are learned scientists), or else he must run the risk, by keeping to generalities, of having a large proportion of the audience coming away with a feeling that they did not learn very much after all. Mr. R. Hafner, the Austrian inventor and designer of the Hafner gyroplane, achieved the apparently impossible last Thursday, when, at the first Royal Aeronautical Society meeting of the present session, he explained his rotating-wing aircraft. He described the take-off, handling and mechanism of the machine; he showed "Mickey Mouse" films of its behaviour, and he came out into the open with the mathematical theory. Thus, we all have something for which to thank Mr. Hafner, each of us according to his own lights and qualifications, and not least for having had the good sense to come to England for the further development of his ideas. Let us hope England shows her appreciation.

With the earlier parts of Herr Hafner's paper it is scarcely necessary to deal, as the Hafner gyroplane was described and illustrated in *Flight* of February 18, 1937. It will suffice if we recall that the rotor blades are allowed a restricted degree of freedom in pitch, being attached to the hub hinges by tie rods, and that the pitch angle is subject to two manual controls via a "spider," bodily vertical movement of the spider increasing the angle of all three blades (during a jump-start, for instance), while tilting of the spider axis causes the blades to perform a cyclic and differential incidence variation, used for ordinary flying control.

Aids to Efficiency

Many must have been impressed, when watching Flying Officer Clouston handling the A.R. III during the past summer, by the extreme manœuvrability of the machine, and by its very wide speed range. The former is due entirely to the very light flying control, which in turn results from Herr Hafner's particular form of blade suspension and control mechanism, while the latter is due partly to the use of an incidence control which permits rotor speed and coning angle to be set for maximum efficiency, and partly to a fairly low power loading. The rotor efficiency is also increased, in the Hafner A.R. III, by the use of blades of relatively small chord and area; in other words by having a low "solidity," i.e., ratio of blade area to rotor disc area, which is 0.0237.

In his mathematical analysis Herr Hafner followed a very interesting line of approach, different from that usually employed. He began by assuming an "ideal" rotor, deduced from this the shape of the rotor blades and their control, and finally investigated how far it is possible to approach in practice such an ideal rotor. In that way he undoubtedly succeeded in painting a clearer picture, particularly to those unable to follow the mathematical arguments, than if he had followed the usual method. Herr Hafner admitted that in the matter of maximum L/D ratio the rotor is definitely inferior to the fixed wing, but he pointed out that whereas the L/D ratio of the fixed wing falls rapidly on each side of the optimum, that of the rotor varies but little with speed, or in other words with flight at angles considerably removed from that corresponding to maximum L/D.

The mathematical analysis indicated that for maximum blade efficiency the lift coefficient should be kept constant. In practice this cannot be done because the chord would have to vary with the phase angle of the blade, but a good practical approximation can be made by using a tapering blade with narrow chord at the tip and wide chord towards the root. Efficiency is also assisted by a compromise by which the thickness ratio of the blade section is varied along the span, a thick profile being used near the root and a progressively thinner profile as the tip is approached. The theoretically most efficient incidence variation along the blade is difficult to achieve in practice, but a fairly close approximation is attained by a built-in blade twist, the incidence increasing from root to tip, assisted by a sine variation around the orbit, imposed by the rotor control giving a minimum incidence in the forward quadrant of the advancing side and a maximum incidence diagonally opposite.

Herr Hafner's analysis of the rotor in forward flight also showed that in a steadily autorotating rotor, although the resultant moment is zero, a portion has a negative moment, thus acting as a windmill driving the rest of the rotor, which is thus virtually a helicopter as to the driven portion. In vertical descent the windmill portion of the rotor forms a circle concentric with the axis. As forward speed increases this circle gradually moves forward.

In concluding his lecture Herr Hafner recorded as his opinion the fact that the emergence from obscurity of rotative wings is mainly due to the courage and determination of such pioneers as de la Cierva and Breguet. Recalling that in the American Guggenheim competition of 1927 the winning machine scored only 22.9 out of a possible 200 points. To-day a rotative-wing aircraft could sweep the board with the whole 200 points.

Herr Hafner expressed the view that in the future fixed-wing aircraft will be confined to fast passenger and mail traffic over long distances between large and well-surfaced aerodromes or sea harbours; the short taxi runs, the door-to-door journeys and the pleasure flying will be done by the machine which can take off and land in small spaces, fly by its own head light beam if need be and transfer the ubiquity of the car to the sphere of the air, i.e., the rotative-wing aircraft. He thought the gyroplane of to-day could perform these duties satisfactorily but envisaged a logical development: the renaissance of the helicopter. Performance calculations gave justification for great expectations.

The Discussion

LT.-COL. J. T. C. MOORE-BRABAZON, who was in the chair, was in his best form. In a hundred years, he said, when many of those present would probably have statues erected to them, it might well be that spectators of the films shown that evening would say, "what marvellous engineers they were a hundred years ago, but what poor photographers!" He stressed the importance of getting good photographs of first attempts, otherwise the pictorial record would be largely lost. ["Moore-Brab." probably spoke feelingly, for was he not the subject of the frontispiece of the very first issue of *Flight*?—ED.]

CAPT. FRANK T. COURTNEY recalled that it was twelve years since he flew the first autogiro in this country. He then came to the conclusion that rotating-wing aircraft was the solution of the safe-flying problem. Although he had, perhaps, seen

more of the troubles and difficulties than most people, both in this country and in America, he was still a firm believer in rotating wings. People seemed to regard them as freaks. They were not. Capt. Courtney could speak with some authority in the matter of safety, for he once had the blades come off an early Autogiro at Hamble.

DR. A. P. THURSTON paid a tribute to the men who had contributed so much to the development of rotative-wing aircraft, Señor de la Cierva and Major Jack Coates. He recalled that Major Coates met Herr Hafner in Vienna in 1930 and gave him his start by setting aside the necessary funds for development. He might also have mentioned Lord Weir and Air Commodore J. G. Weir, who have done so much for the Cierva Autogiro in the same practical way.

MR. R. A. C. BRIE referred to the veiled reference in the paper to helicopters. He thought the direct take-off gyroplane could give 90 per cent. of what the helicopter had to offer and was doubtful of direct-lift machines at no forward speed in the hands of the man in the street.

DR. H. C. H. TOWNSEND asked whether the "Mickey Mouse" films were to scale, in other words whether the curves had been plotted from actual take-offs. He also wanted to know if the whole of the added controllability was due to Herr Hafner's rotor head, or whether there were aerodynamic differences between the Hafner and the Cierva. He did not think the mechanical differences were great enough to account for the difference in manœuvrability. He would like Herr Hafner to tell them whether centrifugal force would become proportionally greater and become serious in larger sizes of machine.

DR. H. C. WATTS congratulated Herr Hafner on emerging from the obscurity of the inventor to the status of a successful constructor. Looking back on rotative-wing evolution he could see three stages. During the first stage they used to worry about the possibility of getting enough lift. That was soon solved. The next stage was how to control the machine. Herr Hafner had shown that this difficulty could be solved. The third stage was now becoming interesting. What would be the performance? He recalled that many years ago he came to the conclusion that the rotative wing was about 15 per cent. less efficient than the comparable fixed-wing aircraft and wondered if modern experience and knowledge had altered that position.

MR. FORMAN contributed the interesting information that the degree of success attained in the United States with rotative-wing aircraft was almost exactly the same as that attained in this country.

MR. ROBERT KRONFELD regretted that Herr Hafner had given up the idea of going up vertically. When a pilot was suddenly confronted by a tall hill when flying in bad visibility it was very nice to be able to ascend to the level of the top of the hill without approaching it closer.

MR. NIGEL NORMAN wanted to know how the gyroplane behaved in the very bumpy air which one might expect to encounter when taking off from or alighting close to tall obstacles.

MR. FRANK RADCLIFFE was interested in the question of blade loadings. The present figure was about 44 lb./sq. ft. Was there an upper limit to the loading? The question had a bearing on the ultimate size of rotative-wing aircraft.

HERR HAFNER took advantage of Lt. Col. Moore-Brabazon's offer to decline to give verbal answers to the questions raised during the discussion and said he would prefer to reply in writing, for publication in the Society's *Journal*.

OLD—BUT NOT CROCKS

A GOOD many people have seen and admired Mr. R. O. Shuttleworth's Cross-Channel Bleriot replica—a machine which is not only beautifully made *and* a genuine replica, but which also flies quite strongly. During next season we may see quite a collection of War and pre-War machines from the same stable at Old Warden, Biggleswade.

Only three weeks ago Mr. Shuttleworth flew a 1916-18 single-seat Hanriot scout from Brussels, making his first and second landings with the machine at Ostend and Lympne before completing the journey to Biggleswade, where Mr. Jackson, his chief engineer, is busy putting the Le Rhone engine installation into shape. Apparently, with the solid-looking undercarriage so very far forward and its small rudder, this Hanriot is something of a handful during and after the touchdown, but otherwise it appears to fly very nicely. It is certainly one of the prettier of the War-time types.

Alongside it in the Warden Aviation workshops, in addition to the Bleriot, there is now one perfectly good and flyable 1911 Deperdussin, powered by a Y-type Anzani. This, like the Bleriot, has been rebuilt from scrap, and the work entailed in making the rounded floor-cum-fairing beneath the fuselage, as an instance, gives one an idea of the patience expended in the old days when every ounce of weight was so important. The fairing has been built up in yacht-hull fashion with three layers of diagonally placed strips and, though very strong, weighs only a few ounces. Somebody ought to strike a special medal for Mr. Jackson and his assistants.

A Sopwith Pup is also in course of development. This was originally the one-and-only Sopwith Dove, a two-seater version of the Pup, and the work involves taking the sweep-back out of the wings—in other words, rebuilding them again. A couple of 50 h.p. Gnomes await attention. In due course a special museum may be erected on the aerodrome, so that these masterpieces may be admired and be out of the way of the more serious work which is going on.

This work includes the manufacture of a Super Desoutter—even now one of the nicest of cabin machines. When this is finished it will be used for earnest long-distance or charter flying, and it is being equipped with full night-flying gear and long-range (700-mile) tanks. Originally a Mark I model, the machine is being thoroughly modified at the forward end to take a Menasco Pirate engine, which is already installed and, with a special vee-type screen of ample depth, to provide the pilot with the best all-round view that it is possible to obtain in a single-engined type. One has only to sit in the partially finished machine to realise how good this view is. The choice of engine was dictated partly by the fact that it has a built-in generator and provision for the fitting of a vacuum pump.

Other modifications include the fitting of elevator and rudder trimming tabs (the operating levers are on either side of the cockpit) and the strengthening of the undercarriage fittings to take the torque reactions of the brakes, which with a castoring tailwheel, have been fitted. Altogether it should be a most interesting machine when it is finally completed.

Still Very Good

CERTAIN figures were quoted in last week's issue of *Flight* for the fatigue tests made on the tie-rods used in the Hafner gyroplane. These were taken from the advance copy of Herr Hafner's paper, and the R.Ae.S. has requested us to point out that they have since been revised and are as follows: The tensile load applied was four times the normal operating load; the torsional oscillation applied was of more than twice the amplitude possible in the aircraft; and the tie-rod underwent about three million reversals, a test equivalent to about 300 flying hours.

A Case—in Case

THE makers of the Exide battery have found a new and appropriate application of their slogan "Long Life." They are now marketing, through their 600 service agents, an excellent first-aid kit. Though primarily intended for the motorist, the kit should appeal to the private air tourist by reason of its compact size and low weight (24 oz.). It contains iodine, burn lotion, Vaseline, smelling salts, sal volatile, aspirins, bandages, adhesive plaster, gauze, lint, cotton wool, safety pins, scissors and tweezers. All these are included at the modest figure of 3s. 6d.

Straight Appointments

TWO recent appointments to the staff of Straight Corporation, Ltd., are announced. Mr. F. G. Jeans, formerly chief maintenance engineer of British Airways, Ltd., has joined the staff as chief engineer. He will be O/C. engineering at all of the Whitney Straight aerodromes, and will supervise the erection of an engine and airframe overhaul depot at Ipswich Airport. There the company's aircraft will be painted in the new scheme of Whitney Straight blue, with silver and scarlet striped rudder.

The second appointment is that of Miss M. de Bunsen, formerly of Heston, where she edited *Heston Flying News*. In her capacity as public relations representative, she will be responsible for the corporation's house publication, *Straight-away*.

The Two-Seater Tipsy

THE new Tipsy Aircraft shops at Hanworth have had the necessary machinery installed and production of a batch of no fewer than 50 two-seaters (with flaps and certain modifications) will shortly be started. The first of the series will have Walter Mikron engines until such a time as there is a suitable British engine available.

PRIVATE FLYING

Not So Dismal

PERHAPS when (and if) our manufacturers lose all their interest in private types, things will not be so terribly dull for us.

A few days ago I spent an educative hour at Old Warden aerodrome, where (as you may read on page 408) ancient machines are made as good as new and where not-very-ancient machines are made a good deal better than new. It would seem that no machine, however dated, is so obsolescent that it cannot be brought up-to-date—and even improved on present-day ideas. A certain amount of money and a lot of energy and originality are necessary if the re-hashed machine is to be a success, but this re-building business certainly gives any owner scope for incorporating his own ideas—provided that the result is passed as airworthy by the powers-that-be.

Since the number of private owners does not appear to be increasing and a large proportion of these owners are already flying, for reasons of economy, machines which are no longer being manufactured, this re-building process may be the solution to our problems. It is already being carried out on an enormous scale, though no special modifications or improvements are usually being made. The other day I met a Moth which was only two letters of the registration away from that on which I made my first solo. Probably it had been re-built again and again so that hardly one little piece of the original Mark I model remained—a Cirrus II engine had, of course, replaced the original Cirrus I.

Not that I seriously suggest that in a few years' time there will actually be no private-owner types to be bought, but the tendency is certainly towards a reduction in their numbers. The market is so ridiculously small that one cannot blame manufacturers for losing their interest and concentrating on military or transport machines. They can't live on air and many of our light aeroplanes have sold at a loss (or at least with precious little profit) during the last few years.

Mass Production

IF only we all wanted the same sort of thing it would not be so bad, but a manufacturer produces what he imagines to be a good healthy compromise by way of taking what there is of a market and two-thirds of his prospective customers sniff and mumble something about "three years out-of-date," or "thing should never have been produced."

What in heaven's name *do* we want, anyway? We just don't know. Oh, yes, we want a machine which is fully equipped at £500, demands no maintenance, has a cruising speed of 150 m.p.h., takes anything in the way of careless handling, is as comfortable and roomy as a small car, and lands at not more than 50 m.p.h. Well, if a thousand pilots rushed forward with their deposits such a machine could probably be produced at the price right now. The trouble is that they don't rush forward and no manufacturer would dare to take the risk of laying down a thousand "air cars." There is no aerodynamic or technical difficulty about making a machine with features and performance figures which closely approximate to those given.

Until people are ready to want the same thing at the same time, little can be done about it, and until an extremely attractive standard type is produced and demonstrated (at a cost of £15,000) people will not be ready to want it.

Topics of the Day

For the moment we need not worry about overcrowding the sky. Even if there were ten thousand private owners there would still be room for everybody provided that strict rules were made and kept in the matter of bad weather flying and radio-controlled areas. As I've said before, the comparatively undisciplined motorist does not jump traffic lights and there is no reason to suppose that the private pilot suitably informed will jump controlled areas. Hearty examples would need to be made of the few who did break the rules

They Are With Us

ANY person who has anything to do with looking through the correspondence of a big newspaper which has just done a little boosting of cheap flying will be able to tell you that there are really thousands of young people in this country who want to fly.

Whether a large proportion of these thousands would be prepared to carry on with their flying after the initial novelty had worn off, and whether a fair proportion would be keen enough to expend capital on buying their own machines is a question which cannot be answered. Personally, I always doubt the avid enthusiasm of the voraciously reading non-flyer. He would really rather fly from the armchair—from which the majority of us also prefer to do our travelling in foreign parts, while complaining bitterly of the drabness of their lives.

I once took up a very theoretical enthusiast who had asked me for months to "do everything I knew" when the promised trip came off and who was quite absurdly certain in his own mind that he could himself fly without instruction. Straight and level flying was quite enough for him and his hand came up to clutch the side of the cockpit whenever I made a gentle turn. Moral: Never shoot a line until after you've done the job—and not then if you can help it. I was only a very little more interested than frightened during my first flight in a Mono-Avro; the ground was such a long way off and there was absolutely nothing to hold us away from it as far as could be seen. The emptiness under a wing is still a source of mild wonder to me on occasion. Somehow, too, I expect to *see* something happening to the air when one pulls a machine up in a stall. It would be a good thing, perhaps, if we could.

INDICATOR.

Private Flying

FROM the CLUBS and SCHOOLS

LONDON

MESSRS. T. G. Waymouth and W. J. Wearne made first solo flights and the latter completed the tests for his "A" licence. New members were Messrs. B. Wardle and D. A. Hughes. Flying for the week amounted to 88 hr. 10 min.

MARSHALL'S

Cross-country flights to Leicester and Reading were made and flying for the week ended October 17 totalled 65 hr. 15 min. New members were Messrs. Hall, Wyatt and Hillman.

MIDLAND

Cross-country flights were made to Leamington, Braunstone, Yeovil and Reading, and the total time spent in the air was 27 hours, 16 of which represented solo. Mr. D. F. Knight is a new flying member.

SOUTH COAST

Lord Winterton, M.P., visited the club on Monday of last week and was shown round the airport and the Volunteer Reserve School by Capt. Duncan Davies and Mr. F. Haddock, the managing director and chairman respectively.

EDINBURGH

Flying last week was mainly confined to the early morning, due to high winds in the afternoons. Seven new members put in an appearance during the week, including Sir Alexander Seton, Bt., and F/O. Lasbrey from Cairo.

C.A.S.C.

In beautiful weather, 10 hr. 20 min. was flown by members at Fen Ditton on Sunday. Messrs. E. K. Gabb and S. C. Brown completed "A" licence tests and Mr. E. Manix made his first flight as a member of the corps.

YAPTON

Cross-country flights have been made to Hatfield and Croydon and a total of 30 hr. 45 min. flying was logged for the week ended October 16. Excellent weather conditions were experienced. Messrs. A. L. Pellegrini and J. Hutton completed "A" licence tests.

YORKSHIRE

Fifty-four hours were flown on club machines this week and Dishforth, Kelso, Liverpool and Birmingham were visited. Mr. G. C. Hepworth and R. G. Parker joined as new members. Mr. M. K. Mann made his first solo whilst Dr. J. G. Ollerenshaw completed "A" licence tests.

SOUTHEND

A club supper and smoking concert is to be held to-morrow, October 22. The annual supper ball takes place on October 29. Tickets are obtainable from the secretary at 10s. 6d. each. Flying during the week was well up to average, especially at the week-end when the machines were booked to capacity.

STRATHTAY

High winds have again interfered with flying, only 17½ hours being logged for the week ended October 10. Mr. W. H. Byards completed his "A" licence tests and Mrs. Ella Watson has the distinction of being the first lady member to obtain her "A" licence.

HANWORTH

Although last week was, on the whole, a very quiet one, several members took advantage of the fine weather to make cross-country flights, including one to Devon and another to Leicester. Mr. F. Appi has obtained his "B" licence, and Mr. Goetz has completed "A" licence tests. Flying totalled 64 hr. 40 min.

CINQUE PORTS

The President of the club, the Marquis of Willingdon, accompanied by the Marchioness, visited the airport for tea and were shown around the new buildings. Messrs. C. Bryan, H. J. Harding, W. E. Howard, and Col. O'Hea made first solos and Messrs. D. Middleton, and C. Bryan have obtained their "A" licences. Flying times amounted to 78 hours.

BROOKLANDS

H.H. Princess Irene Windesgreatz, of Austria, paid a visit to the aerodrome last Sunday and took a trial lesson with Mr. Ken Waller. Fifteen machines visited the aerodrome on Saturday, their owners coming over to see the last B.A.R.C. meeting of the year. A new Tiger Moth was added to the club fleet during the week. Mrs. Duncan and Messrs. Hirst and Hankey have completed "A" licence tests. Flying amounted to 62 hours.

BRISTOL AND WESSEX

On Saturday, November 6, a treasure hunt is to be organised, and will be followed by a sherry party and bonfire. The first of the club dances will be held on December 7 at the Victoria Rooms, Clifton. Messrs. J. M. Storey and H. H. Witts completed "A" licence tests and several new members joined the club. During the month ended October 8, 102 hr. 10 min. flying was logged, and during the week ended October 15 a further 15 hr. 50 min. was achieved.

KARACHI

A total of 209 hr. 10 min. represented the flying for September, 153 hours of which were contributed by solos. Mr. Dastur has obtained his "A" licence. Cross-country flights were made to Hyderabad and other aerodromes. The club was the location of some scenes in "Airmail," a picture made by the Golden Eagle Film Co.

NEWCASTLE

The first social evening of the season is to be held on Sunday, and the organisers have promised a galaxy of talent. Fireworks and a dance to follow will, it is hoped, furnish members with amusement on November 5. Flying was severely handicapped by bad weather during the week and the six machines were rarely on the tarmac. The fleet now consists of three Gypsy I's, a Tiger Moth, a Puss Moth, and a Swallow.

BORDER

Among all these reports of unpleasant weather in the North last week it is pleasant to hear that the Border Flying Club had excellent conditions and spent 55 hours in the air. Mr. Ruding-Bryan completed "A" licence tests and Mr. A. Scott passed his altitude test. Notable visitors were the Marquis of Clydesdale and his fiancée in a Leopard Moth and Lord Londonderry, accompanied by Flt. Lt. Bryant, in his Monospar.

NORFOLK AND NORWICH

The first supper dance of the season was held in the clubhouse on Friday last. It was well attended and voted a great success. The new Gipsy Moth has been most popular and greatly in demand, and the Hornet Moth is also in commission again. During the week a total of 27 hours was flown by members under most favourable weather conditions. The Hon. Derek Keppel and Mr. Smith successfully completed their "A" licence tests. On Thursday night Flt. Lt. Bullmore gave a talk to the members on the method of sending and coding the hourly weather reports that will shortly be required by the Air Ministry.

RENFREW

The Fullerton Trophy relay race was flown at Renfrew Aerodrome on Sunday, October 10, over a triangular course, the turning points being Linwood Works Chimney, Erskine Monument, and back to Renfrew. Teams—which were six in number, four from the Club and two from No. 602 Squadron, holders of the Trophy—consisted of three pilots each. The race was run off in heats and the competitors drew for machines and positions. As soon as the first three had taken off, the second team took up positions and waited for the first team to cross the line on their return. It was a keen contest and great interest was aroused, split seconds separating arrivals. The result was a win and second place for No. 602 Squadron, the teams being (a) G. C. Pinkerton, A. D. Farquhar, R. F. Boyd, and (b) R. G. Chandos, F. A. Mickel, Col. J. Miller. The Provost of Renfrew presented the Trophy to the winners. The total flying time for the week ended October 15 was 41 hours, and several new members have been elected.

"County's" Aerodrome

THE aerodrome developed for the use of the County Flying Club, of Leicester, is now licensed. This is at Rearsby (one mile S.S.E. of Rearsby station) and the dimensions are approximately 700 yards by 600 yards.

The Webster Trophy

B. J. BOURCHIER, of Toronto, was awarded the Webster Trophy—the most important Canadian flying award—at the annual light aeroplane meeting at Hamilton, Ontario. Bourchier is a member of the 10th squadron of the Canadian Air Force Reserve. Second prize went to Gordon R. McGregor, of the Kingston Flying Club, who had been awarded the Webster Trophy in the two previous years.

The Jaipur Accident

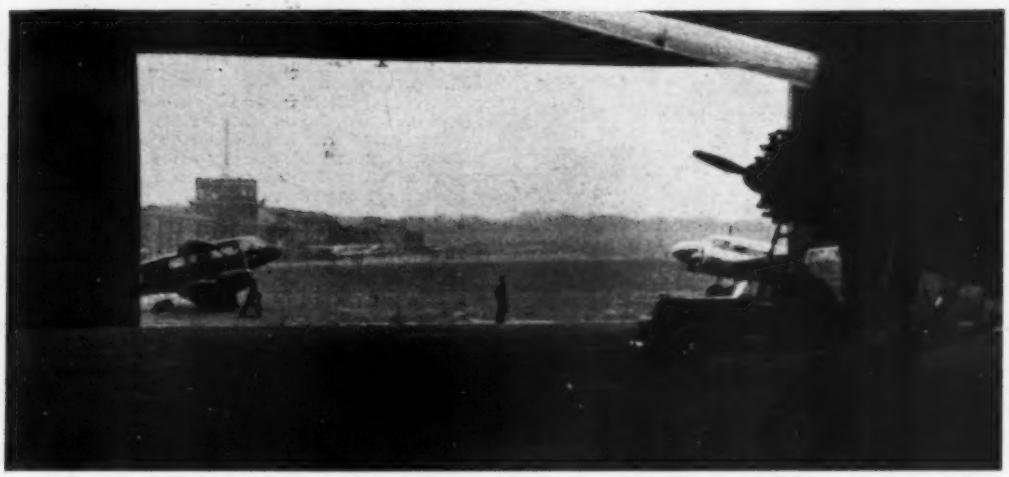
IT is with regret that we record the death, in a flying accident at Jaipur, of Lt. Patrick Randolph, of the Grenadier Guards. He was quite a well-known and popular amateur racing pilot and a keen private owner. The condition of Mr. P. Q. Reiss, who was with him in the machine, is stated to be serious.

Tigers for New Zealand

FOLLOWING the Government scheme, hinted at in *Flight* a few months ago, for assisting the New Zealand clubs, a pooled order for seven Tiger Moths has been received by the De Havilland Aircraft Company. These will be completely equipped (probably with full blind-flying material) and will be fitted with H.P. slots.

The new scheme involves the loan of sums, free of interest for three years, to the clubs for the purchase of approved types of machine. At present there are ten clubs in active existence, owning some forty D.H. Moths between them.

COMMERCIAL AVIATION



LONDON'S TERMINAL : The Croydon terminal building framed in the opening of Rollason's hangar. (*Flight* photograph.)

THE WEEK AT CROYDON

A Traffic Record : Aircraft Testing by Committee ? K.L.M. Nearing Ten Million Miles on Batavia Route : Fleet Street George Washingtons Again

THE air travel boom, to Paris especially, continues, and in the case of Paris has reached unprecedented heights. Last Friday, for example, the record for the greatest number of services to that city was broken with a total of twenty-four in one day, of which Imperial Airways flew fourteen, Air France four, and British Airways six. The greatest one-day total of services ever before flown to Paris is eighteen, so far as I can ascertain, which happened one day in the height of summer.

Imperial Airways, they say, have had to put all their 86B machines from the Budapest and Basle routes on to the Paris run. Paris at the moment is exceptional, of course, but there is a steady increase this winter on previous years' traffic all round.

On Sunday a special twin-motor Heinkel brought distinguished visitors from Berlin. They were General der Flieger Staatssekretär Milch (German Under-Secretary of State for Air), the famous Major-General Ernst Udet (Staff Major-General of the German Air Force), and other prominent officers. Major-General Udet, incidentally, is said to have accounted for 62 Allied machines during the war. The party was met at Croydon by A.V.-M. Richard Peirce, Group Capt. J. L. Vachell and Wing Cdr. R. V. Goddard. Group Capt. Don, O.B.E., British Air Attaché in Berlin, accompanied the party from Germany. In spite of a head wind the flight was made from Berlin to Croydon in 3 hours 5 minutes.

The Air Ministry has requested that pilots should report whenever they encounter ice formation, and this information will be broadcast. Splendid, but cases of ice formation, and any other weather intelligence likely to be of use to fellow pilots, has always been reported by airline pilots of all nationalities. It is one of the traditions of the air to do so.

A curious story appeared in the newspapers regarding a proposal for six pilots of very great experience, who were named, to test all new types of commercial aeroplanes before their acceptance. Such an idea, officially administered, might not be a bad one, for there is no doubt that the manufacturer's test pilot cannot be expected to know what is really required of an air liner in everyday, jog-along, all-weather practice, and that nobody can possibly know these requirements so well as the airline pilot. However, there seems to be no official confirmation from any of the companies of anything of the kind. Actually, what is needed is a committee consisting of (a) technical people who have to maintain the air liner; (b) passengers who have to sit in it and endure the alleged comforts often light-heartedly introduced by the manufacturer; (c) traffic people who have to load and unload the machine—a matter which becomes increasingly difficult with certain designs of commercial airliner; and (d) a whole host of other interested parties, not excepting the cabin sweepers, who probably have a lot of good advice to give regarding their particular department.

Primo Carnera also arrived last week from Paris by Imperial. He is said to have had the intention of travelling by British Airways Lockheed, but to have sacrificed speed in favour of the somewhat unusual leg-room he demands. One visualises Primo hiring *Heracles* complete as a sleeper, and lying down with his head against the cockpit-cabin door and his feet against the passengers' entrance door.

Overland to the East

Now that Imperials no longer disembark Far Eastern travellers at Croydon the solar topee is seen only when the K.L.M. connection of the Amsterdam-Batavia line arrives. This service now has stewards on every machine and is operated three times a week. Fairly shortly the 500th return flight will be celebrated (the service having commenced as far back as 1928), when 10,000,000 miles will have been flown on this route.

One of the Sunday newspapers has a headline expert, the nimbleness of whose low cunning is beyond praise, if one is in the habit of praising that sort of thing. The K.L.M., unhappily, had an accident in the East some ten days or more back, and after that two disasters occurred to Dutch military machines out there. "Three Dutch Air Disasters in Ten Days" was the result.

Actually, the best effort of this kind I remember was when, circulation being down, I presume, an evening paper came out with scarlet posters: "Croydon Crash: Five Dead." Many an air traveller's wife was thereby thrown into fits and everyone concerned with civil aviation was alarmed. Little George Washington of Fleet Street won again, however, for there had been a crash at Croydon—a car crash somewhere near the town hall. A. VIATOR.

Commercial Aviation

Balz Zimmermann

IT is with regret that we record the death, after a short illness, of Herr Balz Zimmermann, managing director of Swissair and founder of the company. His loss will be felt both by Swissair and by the country, for he was a public figure of very considerable importance.

Transport Subsidy

THE London Chamber of Commerce has submitted to the Secretary of State for Air a memorandum dealing with the development of British air transport. The Civil Aviation Section of the Chamber feels that more routes could be subsidised with advantage, and that the aircraft manufacturing industry would be able, indirectly, to increase the available market, if it was encouraged in this way to develop new types.

The American Disaster

AS we go to press we learn that a search party has reached the wreckage of the United Airlines D.C.3, which crashed on Haydon's Peak, on the Utah-Wyoming border, at a height of 12,000 ft. All the occupants—sixteen passengers and three members of the crew—were found to be dead. The machine was flying on the recently inaugurated sleeper service between New York and San Francisco.

Ice Reports

PILOTS are now being asked to report icing conditions when these are encountered, giving information concerning the locality, time, height and cloud conditions. The "Q" code groups used are QFT, QBB and QBJ—height and place of accretion, height of cloud base and height of cloud top. Pilots without radio are asked to report on arrival at their destinations.

Radio at Inverness

THE D/F station at the Longman Airport, Inverness, is now ready for use and the operators merely await definite instructions from the Air Ministry to bring it into actual operation. It is expected that the station will be brought into use early next month. The station should, in fact, have been in operation some time ago, but trouble was experienced through local radio interference.

The establishment of this station foreshadows an important development in the air services from Inverness. The introduction of such a service was a stipulation laid down by the Air Ministry before they gave the Corporation permission to extend the landing area.

Trans-Canada

THE first Lockheed for Trans-Canada Airways left Burbank on its delivery flight on October 4. Three of these machines will be standard Electras and the others will be Lockheed 14s, carrying eleven passengers and crew at a maximum of 250 m.p.h. No date has yet been set for the opening of the Trans-Canada airway from Winnipeg or Montreal westward.

Meanwhile, Canadian Airways are experiencing the busiest season in years. For the first nine months of 1937 the company's machines flew an average of 5,900 miles a day, carried a daily average of fifty passengers, 1½ tons of mail and 10½ tons of express and freight

Large-scale Maintenance

WHEN Rollasons started in with their customary energy on the business of sub-contract work, a good many people imagined that they would have less time for, and interest in, maintenance and C. of A. work. In fact, they appear to be doing more and more as the months go by.

A fortnight ago when we looked around their shops at Croydon there was hardly room to move, and it was difficult to realise that so many machines could have been crowded into such a comparatively small space. Some of these were, of course, merely being housed, but a large number were having work of one sort or another, carried out on them, and the engine shop was equally busy—Praga engines from Manchester were among the overhaul items.

Most interesting of the "rebuild" jobs, possibly, is that on a Curtiss Condor belonging to International Air Freight. This had, it appears, suffered rather badly from an error of judgment on an early flight after its erection at Southampton, and Rollasons have cleverly competed with the ticklish job, among others, of replacing a section of steel longeron near the wing root. This without stripping the airframe.

Anther interesting piece of work is a half-completed Spartan three-seater. This is being built up by two inspectors in their spare time—and by way of keeping in practice.

The Bloch 220 at Croydon

DURING the course of the coming week people in this country will have their first opportunity of inspecting one of the fastest commercial machines produced in Europe—the new Marcel Bloch 220 18-seater, a large number of which are now in process of delivery. The machine is to be used on the Air France London-Paris, London-Geneva and London-Marseilles services.

The Marcel Bloch 220 is a low-winged cantilever monoplane fitted with two Gnome-Rhone K.14 supercharged engines of 870 h.p. each. It has achieved in official tests a top speed of 220 m.p.h. at a height of 7,350 feet. and using 60 per cent. power cruises at 190 m.p.h. It has, of course, a retractable undercarriage as well as slotted flaps.

Re-equipping D.D.L.

THE Junkers people at Dessau are reported to have offered D.D.L. three triple-engined Junkers at a reasonable price. These machines, which at the moment are being used in African services, will be reconditioned, after which operation they will emerge as twin-engined craft. The offer has not been accepted by D.D.L. as yet, as the company requires rather faster machines.

Meanwhile, it was announced in Copenhagen on October 16 that the Ministry of Public Works on principle agrees to the projected increase of capital in D.D.L. as propounded by H.H. Prince Axel and Mr. Gunnar Larsen. This means that D.D.L. will be able to purchase new Douglas DC3s as planned some time ago.

Dublins' New Airport

TESTS will shortly be carried out at the new civil airport at Collinstown, Dublin. The main runway is now ready, and D/F equipment has been installed. Between 400 and 500 men are at present working on the site, which embraces over 750 acres. The estimated cost of the airport is approximately £150,000, of which the Government is contributing £75,000, and the Dublin Corporation £58,000; the remaining £17,000 being put up by Dublin County Council.

Still more men are at present engaged on excavation, levelling, drainage and road-making at the transatlantic air base at Rynanna. A seventy-ton dredger is making the second of three drainage canals, and a three-mile concrete road is being made to connect with the main Ennis-Limerick highway. The Minister for Posts and Telegraphs has purchased a site adjacent to the aerodrome for the erection of a meterological station which, it is stated, will be the largest of its kind in Western Europe.

News from the Baltic

ACCORDING to the *Baltijas Korespondence*, winter operation will for the first time be introduced on the airlines passing Riga, Latvia. The new arrangement applies to the lines operated by Russian, Swedish, German and Polish companies. The Lufthansa is thus reported to have made an agreement with L.O.T. regarding three weekly runs on the Riga-Tallinn-Helsingfors line. The service is being operated from November 1 to February 15 by the German and Polish machines, and from the latter date by the Finnish Aero.

The Stockholm-Helsingfors service is being reduced to one daily connection as from November 1. This schedule will be maintained throughout the winter. The direct services between Stockholm and the Continent are being maintained during the winter, these being the express route Stockholm-Berlin and the Amsterdam-London-Paris service. In co-operation with D.D.L. and D.L.H., A.B. Aerotransport will participate in a daily winter service between Malmö and Berlin. An innovation is the new local service between Copenhagen and Hamburg, which will be operated jointly by D.D.L. and A.B.A. Another novelty is that for the first time a winter service will be maintained between Copenhagen and Stockholm.

The Franco-Belgian pool arrangement on the Scandinavian run was brought to an end when the winter schedule opened on October 3. The line will be operated by Sabena, using Savoia-Marchettis. The route has, however, been shortened in that the terminus has been moved from Stockholm to Malmö. Meanwhile, it is understood that Air France will open a direct express route Paris-Copenhagen next year, probably as from April 1. Speaking of express routes, it is being said in Danish aviation circles that D.D.L. is planning a fast direct line between Copenhagen and London. The Russian company, Aeroflot, will operate the Moscow-Stockholm line twice weekly during the winter. Swedish authorities have granted a permission on condition that mail and freight only is being carried over the line. No passenger transport will be consented to, partly because of the risk of icing and partly because of the dangers of crossing the open sea between Riga and Stockholm.